CA2ONEV 83I56
Toronto Area Watershed Management Strategy Study.
INTERIM REPORT ON TORONTO AREA WATER QUALITY. 1983.

Ca2 ONEV 83I56

3 1761 09547026 6

AREA WATERSHED MANAGEMENT STRATEGY STUDY

INTERIM REPORT ON TORONTO AREA WATER QUALITY

Earth Sciences Library

April, 1983

INST. FOR ENVIRONMENTAL STUDIES
UNIVERSITY OF TORONTO
3 1761 03882117 9

I.E.S.
FEB 4

Ministry of the Environment
Ontario

The Honourable
Andrew S. Brandt
Minister

Brock A. Smith
Deputy Minister

TORONTO AREA WATERSHED MANAGEMENT STRATEGY STUDY

INTERIM REPORT ON TORONTO AREA WATER QUALITY

April 1983

Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario M4V 1P5

Digitized by the Internet Archive
in 2025 with funding from
University of Toronto

https://archive.org/details/31761095470266

TABLE OF CONTENTS

	Page
List of Tables	ii
List of Figures	iv
1. Introduction	1
2. Data Base	2
2.1 Existing Data	2
2.2 TAWMS Surveys, 1981	2
2.3 Data Interpretation	3
3. Results and Discussion	4
3.1 Bacteria	4
3.2 Nutrients	4
3.3 Water Clarity and Conductivity	6
3.4 Heavy Metals	6
3.5 Trace Contaminants	8
4. Conclusions	11
5. Proposed TAWMS Activities, 1982-1986	13
References	14

LIST OF TABLES

		PAGE
Table 1:	Locations of Stations used in Water, Sediment and Biological Sample Collection	15
Table 2	Nutrients and Associated Physical/Chemical Parameter Concentrations in River Waters: TAWMS Sampling Program, 1981	18
Table 3	Un-ionized Ammonia Concentrations in River Waters, 1978-80: Routine Monitoring Program	21
Table 4	Trace Metal and Nutrient Concentrations in Surface Bed Sediments: Routine Monitoring Program, 1980	22
Table 5	Trace Metal and Nutrient Concentrations and Particle Size Analyses of Surface Bed Sediments: TAWMS Sampling Program, 1981	23
Table 6	Nutrients and Associated Physical/Chemical Parameter Concentrations in Sewage Treatment Plant Effluents: TAWMS Sampling Program, September 25 and October 1, 1981	26
Table 7	Trace Metal Concentrations in River Waters: Routine Monitoring Program, 1978-1980	27
Table 8	Trace Metal Concentrations in River Waters: TAWMS Sampling Program, 1981	28
Table 9	Trace Metal Concentrations in Sewage Treatment Plant Effluents: TAWMS Sampling Program, September 25 and October 1, 1981	31
Table 10	Trace Contaminant Concentrations in River Waters: Routine Monitoring Program, 1978-1980	32
Table 11	PCB/Organochlorine Pesticide Concentrations in Filtered River Water: TAWMS Sampling Program, October 1, 1981	33
Table 12	Carbamate Concentrations in River Waters: TAWMS Sampling Program, October 1, 1981	36
Table 13	Organophosphate Pesticide Concentrations in River Waters: TAWMS Sampling Program, October 1, 1981	39

LIST OF TABLES, continued

		PAGE
Table 14	Triazine Herbicide Concentrations in River Waters: TAWMS Sampling Program, October 1, 1981	42
Table 15	Chlorophenoxy/Chlorobenzoic Acid Herbicide Concentrations in River Waters: TAWMS Sampling Program, October 1, 1981	45
Table 16	PCB/Organochlorine Pesticide Concentrations in Surface Bed Sediments: Routine Monitoring Program, 1980	48
Table 17	PCB/Organochlorine Pesticide Concentrations in Surface Bed Sediments: TAWMS Sampling Program, 1981	49
Table 18	PCB/Organochlorine Pesticide Residue Concentrations in Freshwater Clams after 21 Days Exposure in River Waters: TAWMS Sampling Program, 1981	52
Table 19	PCB/Organochlorine Residues in Young-of-the-Year Fish Species Collected from the Don River, Humber River and Mimico Creek: TAWMS Sampling Program, 1981	55

LIST OF FIGURES

		PAGE
Figure 1	TAWMS Study Area	56
Figure 2	Fecal Coliforms in Mimico Creek, 1978-1980	57
Figure 3	Fecal Coliforms in the Humber River, 1978-1980	58
Figure 4	Fecal Coliforms in the Don River, 1978-1980	59
Figure 5	Total Coliforms in Mimico Creek, 1978-1980	60
Figure 6	Total Coliforms in the Humber River, 1978-1980	61
Figure 7	Total Coliforms in the Don River, 1978-1980	62
Figure 8	Total Phosphorus in Mimico Creek, 1978-1980	63
Figure 9	Total Phosphorus in the Humber River, 1978-1980	64
Figure 10	Total Phosphorus in the Don River, 1978-1980	65
Figure 11	Suspended Solids in Mimico Creek, 1978-1980	66
Figure 12	Suspended Solids in the Humber River, 1978-1980	67
Figure 13	Suspended Solids in the Don River, 1978-1980	68
Figure 14	Turbidity in Mimico Creek, 1978-1980	69
Figure 15	Turbidity in the Humber River, 1978-1980	70
Figure 16	Turbidity in the Don River, 1978-1980	71
Figure 17	Conductivity in Mimico Creek, 1978-1980	72
Figure 18	Conductivity in the Humber River, 1978-1980	73
Figure 19	Conductivity in the Don River, 1978-1980	74

1. INTRODUCTION

The five-year Toronto Area Watershed Management Strategy Study (TAWMS) was initiated in 1981 by the Ministry of the Environment. Although wholly funded and managed by MOE, TAWMS receives extensive cooperation and support from the Metropolitan Toronto and Region Conservation Authority and from the Boroughs and Cities of the Municipality of Metropolitan Toronto. This multi-agency approach is vital to the success of the project and to the implementation of study recommendations.

The purpose of the study is to seek out locations in Toronto where water quality requires improvement, and to develop cost-effective measures for achieving that improvement. The study's overall goal is to produce a comprehensive water quality management plan for the Toronto area watershed, with particular emphasis on the Don and Humber Rivers and Mimico Creek. The TAWMS study area is shown in Figure 1.

This report summarizes work carried out in the first year of TAWMS which was directed towards a closer definition of existing water quality conditions within the study area. The work relied heavily on historical and recent water quality data collected through the routine sampling programs of MOE and other agencies, but also made use of information from a limited sampling program undertaken by TAWMS in 1981 to supplement the routine data base.

This report provides additional information which supplements the findings of the Ministry of the Environment's Central Region 1979 report "Water Quality Indices of Streams in the Ministry of the Environment Central Region", which was based only on 1978 data.

2. DATA BASE

2.1 Existing Data:

The existing data base incorporated information from a number of programs within MOE. Most of the data are for conventional pollutants such as nutrients and bacteria; data for heavy metals and trace organics are only available for a few locations near the mouths of the Don and Humber rivers. The locations of routine program station are described in Table 1 and shown in Figures 1-4. Only data from 1978-1981 were utilized in this analysis to ensure that results are representative of conditions prevailing in 1981. 1978-1980 data were drawn from the Provincial Stream Quality Monitoring Network; 1980 data were derived from the MOE Enhanced Tributary Monitoring Program.

2.2 TAWMS Surveys, 1981:

A sampling program was undertaken by TAWMS in 1981 to supplement existing data, especially for heavy metals and trace organic contaminants such as pesticides and industrial chemicals. However, as some of these compounds are difficult to detect in water samples (because of low concentrations and insolubility), TAWMS also collected stream bed sediment and clam and fish tissue samples, both of which have been demonstrated to accumulate and concentrate a number of trace contaminants.

Two TAWMS surveys (September 25, 1981 and October 1, 1981) were conducted at twelve river and six sewage treatment plant effluent stations. The surveys were designed to represent baseline and storm conditions, respectively. All samples were analyzed for nutrients, metals and physical parameters such as turbidity; the storm samples were also analyzed for trace contaminants. TAWMS station locations are described in Table 1 and shown in Figure 1.

Bed sediment samples (top 5 cm) from special TAWMS surveys, collected using coring and dredge apparatus, were subjected to analyses for particle size and nutrient, heavy metal, PCBs, organochlorine and other pesticide concentrations.

Tissues from freshwater clams caged at 12 stations for 21 days were analysed for PCBs, organochlorine and other pesticide concentrations. Other biological monitoring involved the collection of juvenile fish from 9 locations in the Humber and Don rivers and analysis of their tissues for the same contaminants.

2.3 Data Interpretation

In reviewing the results of all surveys, it is important to note that up until approximately October, 1981, the Pugsley and North Don sewage treatment plants in Richmond Hill, and the John Street plant in Thornhill, were in operation and discharged their treated effluent to the Don River system. In the late fall of 1981, these plants were removed and their sewage flows directed to the York Durham sewer system for treatment at the Duffin Creek plant. The North Toronto plant is now the only remaining municipal sewage treatment plant discharging to the Don River.

All data presented in this report have been compared against Provincial Water Quality Objectives where possible. In some cases, where no objective or criterion has been defined for a parameter (often the case for trace organic compounds), the presence or absence of the contaminant has simply been noted.

3. RESULTS AND DISCUSSION

3.1 Bacteria:

All rivers in the study area were moderately to severely contaminated with coliform bacteria. Most stations in the three watersheds showed geometric mean total coliform bacteria densities which exceeded Provincial Water Quality Objectives for total body contact recreation. Fecal coliforms also exceeded objectives at all locations except for the headwaters of the Main Humber River (near Bolton), and the mouths of the East and West Humber rivers. As expected, individual concentrations of bacteria were extremely variable, especially at those stations downstream of storm sewers, combined sewer overflows, or sewage treatment plant (STP) discharges (where wet weather bypass of normal operation may occur). Geometric mean bacterial results are illustrated in Figures 2-7.

This bacterial contamination poses a potential public health hazard where people wade, swim or bathe and therefore curtails recreational use of the river waters.

3.2 Nutrients:

Total phosphorus levels were high throughout the study area, even in the headwater areas of the Humber and Don Rivers (see Figures 8-10 and Table 2). Concentrations exceeded the 0.03 mg/L guideline to avoid nuisance algae growth in streams, and exceeded 1.0 mg/L in upper German Mills Creek where the Pugsley Sewage Treatment Plant was located (Station 85-005, Figure 10). Filtered reactive phosphorus levels tended to be higher at river mouths than in headwater reaches and comprise anywhere from 5% to 94% of total phosphorus (Table 2). Higher

proportions of filtered reactive phosphorus (greater than 30-40% of total phosphorus) are typical of sewage treatment plant effluents and combined sewer overflows. The higher concentrations of this parameter in downstream reachesundoubtedly reflect the presence of these discharges in urbanized areas. Un-ionized ammonia concentrations were generally within the 0.02 mg/L objective for the protection of aquatic biota, except in areas known to receive STP discharges, stormwater runoff, or combined sewer overflows. Most often in violation of the objective for this parameter were the mouth of Black Creek and the Don River downstream of the confluence with Taylor Creek (Table 3).

In routine and TAWMS sediment sampling total phosphorus was always and total Kjeldahl nitrogen often in excess of MOE guidelines for the open water disposal of dredged material (Persaud and Wilkins, 1976). The results of these sediment sample analyses are presented in Tables 4 and 5.

High nutrient concentrations in sediments were often associated with high percentages of organic material in the sediment (expressed as loss on ignition), suggesting an organic source or sources of contamination such as stormwater runoff, combined sewer overflows, or sewage treatment plant outfalls. Analyses of sewage treatment plant effluents did in fact show very high concentrations of total phosphorus (although the measured values may not be representative of typical conditions; see note in Table 6), filtered reactive phosphorus, total Kjeldahl nitrogen, filtered ammonia, nitrate and nitrite (Table 6). These nutrient levels provide the potential for excessive plant growth wherever physical conditions are conducive to it. No data are yet available on the nutrient concentrations present in combined sewage and urban stormwater runoff so the importance of these sources in generating nutrient loadings to the stream remains uncertain at present.

3.3 Dissolved Oxygen

Limited routine dissolved oxygen monitoring carried out on the watersheds under daytime conditions has shown that dissolved oxygen concentrations in the study area generally meet the objective for that parameter. No additional monitoring was carried out as part of the TAWMS program, but special oxygen studies which will include both night and daytime data collection are planned in future phases of TAWMS.

3.4 Water Clarity and Conductivity:

Suspended solids concentrations were moderately high throughout the study watersheds (Table 2, Figures 11-13). The mouth of the Humber River (Station 83-001) and the Don River at Pottery Road (Station 85-014, about 4 km upstream of the mouth) exhibited the highest annual mean daily concentrations in the study area. Lowest levels were observed in the background Humber River station at Bolton. Turbidity measurements in the watersheds corroborated these observations, with highest turbidity usually found in the river sections farthest downstream (Table 2, Figures 14-16). This pattern would suggest that urban storm runoff and instream and bank erosion contribute suspended material to the streams.

Conductivity displayed patterns similar to those observed for nutrient and clarity parameters (Table 2, Figures 17-19). Highest conductance was seen in more heavily urbanized portions of the watersheds and lowest conductance in the headwaters of the Humber River. In general, conductance was highest during the low flow survey (September 25, 1981) and lowest during the storm survey (October 1, 1981), presumably because of dilution effects during high flows. Elevated chloride concentrations are sometimes responsible for high conductance; primary sources of chloride in urban areas are road salt in winter, and sewage treatment plant and combined sewer outfalls year-round. Large fluctuations and high winter chloride concentrations have in fact been measured in Toronto area rivers (Ralston and Hamilton, 1978) and it is believed that deicing salt is a large local source of that chloride.

3.5 Heavy Metals:

Heavy metals data, like data for trace organic compounds, were very limited for the Toronto watersheds. Most historic observations were for stations close to the mouths of the Don and Humber Rivers. At those stations, data were available for copper, zinc, lead, cadmium and mercury, but mercury results were for unfiltered samples and were difficult to interpret in light of the filtered-water criterion of 0.2 ug/L. Of the other parameters, copper and zinc most frequently exceeded the provincial water quality objectives, with cadmium and lead also occasionally in violation (Table 7). TAWMS sampling results showed similar patterns (Table 8). Chromium, which was also measured in the TAWMS program, showed no violation of objectives. Generally, heavy metal concentrations were higher in the Don than in the Humber River.

Routine surface bed sediment samples from two stations in the watersheds showed that copper, chromium, zinc, cadmium and lead approach or exceed MOE dredging guidelines at both stations monitored (Table 4). TAWMS sediment sampling revealed violations of the guidelines for those parameters only near the mouth of the Humber River and, for lead, at the mouth of Black Creek (Table 5).

Sewage treatment plant effluents entering the rivers were also observed to contain high concentrations of copper, zinc, cadmium and lead during both TAWMS surveys in 1981 (Table 9). As with other parameters such as nutrients, it is likely that the discharge of sewage treatment plant effluents into the streams, and storm runoff from urbanized areas, are largely responsible for heavy metal contamination in the receiving streams of the watersheds.

It should be noted that all these metals (copper, nickel, cadmium, chromium, lead and zinc) are widely used in the Great Lakes basin for a variety of industrial purposes, including

metallurgy and metal fabricating, manufacturing of electronics, pigments, paints and glazes, photography, lithography and the production of chemical products. The burning of fossil fuels, including coal, oil, and gasoline, releases quantities of heavy metals into the atmosphere and thus onto streets and other land surfaces, from which they may be washed into stream waters. The relative significance of these various sources in generating heavy metal loadings to the streams remains uncertain but will receive continuing investigation in future phases of TAWMS.

3.6 Trace Contaminants:

Routine and TAWMS monitoring programs in the study area showed that 14 PCB/organochlorine compounds of 22 analysed have been detected in river water samples (see Tables 10 and 11). A number of these compounds were found in concentrations exceeding provincial objectives. PCB's were the most commonly found contaminant, often in violation of the objective for that parameter. PCP (pentachlorophenol) concentrations only rarely occurred in detectable concentrations in the 1981 TAWMS survey. The compounds most frequently detected in river water samples were αBHC, γBHC (Lindane), and Dieldrin; γBHC (Lindane) and Dieldrin were both in violation of the provincial water quality objectives. Other parameters occurred with variable frequency. Of those with objective levels established, Heptachlor Epoxide and Endrin were found in concentrations higher than the provincial objectives in the single TAWMS survey.

However, it must be emphasized that most compounds were not detectable in water samples. Those not detected include Heptachlor, Aldrin, Mirex, αChlordane, γChlordane, oxy Chlordane, most metabolites of DDT, methoxychlor, all carbamates examined, all orthophosphate pesticides examined

except Diazinon, most triazine herbicides examined and most chlorophenoxy/chlorobenzoic acid herbicides examined (see Tables 11-15).

In general, the parameters found in detectable concentrations in the Toronto area streams were similar to those found in four other Ontario and nine U.S. urban river systems (O'Neill, 1979; EPA, 1982). Contaminant concentrations in all the Ontario and U.S. systems were observed to vary widely; this may be attributable in part to differences in analytical techniques among laboratories. However, it can be concluded that the Humber and Don Rivers and Mimico Creek do not differ significantly from other similar systems in terms of trace organic compound contamination. It is difficult to make direct comparisons between river systems, since the particular set of contaminants found in any one system is probably largely dependent on the industrial mix in the system watershed.

(Note that no MOE objectives now exist for αBHC, PCP, 2,4,5-T and many other compounds. The reader is referred to the MOE publication Water Management Goals, Policies, Objectives and Implementation Procedures (November, 1978) for details of guidelines.)

Sediment samples taken throughout the watersheds in routine and TAWMS monitoring revealed detectable concentrations of PCBs, ΣDDT, ΣBHC, ΣChlordane and Heptachlor Epoxide at a very few sites, notably the mouth of the Humber River. Thiodan II (Endosulfan) was also found in the Humber River at several sediment sampling locations. However, as with water samples, most compounds were not detected at most stations (Tables 16 and 17).

*Note: "Σ" implies "total".

Clams (Elliptio complanatus) left caged in the study area for three weeks concentrated detectable levels of PCBs, Σ DDT, Σ Chlordane, Heptachlor Epoxide and α and γ isomers of BHC). Other compounds less commonly found were HCB, Thiodan I and Dieldrin (see Table 18).

Young-of-the-year fish collected from stations in the three watersheds also had accumulated detectable concentrations of PCB's, Σ DDT, Σ BHC and Σ Chlordane (Table 19). Lowest concentrations in the fish tissue were observed in those samples obtained from the less urbanized section of the Humber River at Finch Avenue, while the highest concentrations were found in heavily urbanized areas such as Black Creek and the Don River. Table 19 shows that several species were used in the 1981 surveys, depending on location (some species were not found at some locations). Caution must therefore be used in comparing data from one species to another until differences (if any) in the bioaccumulation mechanisms of the species are more closely defined.

Upstream of the mouth of the Humber River, only common shiners were collected; in that stretch, very high levels of PCBs were noted at the Scarlett Road site (F4), suggesting the possibility of a source of PCBs there. It should also be noted that a significant decline was observed from 1977 to 1979 in PCB residues in spottail shiners from the mouth of the Humber River (Suns et al., 1981). 1977 levels approached 2200 ng/g, dropping to about 1200 ng/g in 1979. Table 19 demonstrates a further reduction in 1981 to about 950 ng/g.

Finally, it must be emphasized that most of the trace contaminants discussed above have been monitored for fewer than five years, so it is difficult to assess trends over time.

4. CONCLUSIONS

Recent water quality data from the Don and Humber Rivers and Mimico Creek demonstrate that the urbanized portions of those watersheds exhibit the poorest water quality. The Don River and Mimico and Black Creek watersheds are almost entirely urbanized at present and show the most degraded water quality overall. The West and Main Humber Rivers exhibit relatively good water quality at stations farthest upstream, but with increasing distance downstream, progressive water quality deterioration is apparent. In general, sediment and biological tissue samples corroborate findings from water samples, although more trace organic compounds were detected in sediment and biota than were found in water samples. However, because the data base for heavy metals and trace organic compounds is so limited in areal and temporal extent, conclusions about the nature and implications of data for those compounds must be considered only tentative at present.

The following paragraphs summarize the conclusions formulated from the Phase I work.

1. Bacterial densities throughout the urbanized portions of the watersheds indicate continuing contamination of surface waters, to the extent that body-contact recreation often must be restricted at locations in the watersheds.

2. Nutrient concentrations throughout the watersheds indicate continuing enrichment of stream waters. This situation can potentially endanger aquatic life by promoting the growth of nuisance algae.

3. Suspended sediment and turbidity measurements indicate that substantial erosion is ongoing in the watersheds, both from instream processes and from sheet erosion carried by surface runoff.

4. Conductivities are high in urbanized portions of the watersheds, indicating substantial contributions of dissolved salts and minerals there; these probably arise in large part from urban runoff during storm events.

5. Copper, zinc, cadmium and lead in the rivers were often found at concentrations in excess of water quality objectives and in sediment at levels above guidelines for the open water disposal of dredged material. The extent of their occurrence in the study area is not yet well documented.

6. PCB's and organochlorine, triazine and chlorophenoxy/chlorobenzoic acid compounds were detected in water, sediment and biological tissue samples throughout the study area. In some samples at some locations, parameters with established objective levels were observed in excess of those levels. Most trace organic compounds for which water quality analyses were performed were found in low concentrations or were not detected. Sediment samples also showed undetectable levels for most compounds at most stations.

   The limited data base available for these contaminants does, however, preclude the drawing of firm conclusions about their sources and pathways in the study area. However, the contaminants found in the Toronto area rivers appear similar to those observed in four other Ontario and nine U.S. urban river systems. Additional data to be collected in future phases of TAWMS are expected to shed light on this issue.

5. PROPOSED TAWMS ACTIVITIES, 1982-1986

1. Because the water quality in the rivers was observed to be worst in urbanized areas, future TAWMS activities will focus on those portions of the Don and Humber River and Mimico Creek basins within Metropolitan Toronto boundaries (i.e., south of Steeles Avenue).

2. Particular attention will be directed to further study of pollutants which are of most concern for public health reasons (i.e., bacteria), which are most persistent in aquatic systems (i.e., trace organic compounds), or whose distribution and severity of contamination in the study area are least well known (i.e., trace organics and heavy metals).

3. TAWMS activities will be divided into "source" studies of outfalls and other sources of contamination, and studies of the receiving stream waters. All TAWMS activities in the watersheds will be coordinated with ongoing waterfront monitoring programs.

4. Research efforts will be directed primarily to the abatement of water quality problems. Urban stormwater runoff, combined sewer overflows and sewage treatment plant effluents appear to have particular significance in the impairment of receiving stream water quality, especially with respect to bacteria, nutrients and heavy metals.

5. Water quality sampling programs will be designed to monitor and characterize sources such as storm flows, spring runoff from snowmelt, and individual effluents. In particular, a comprehensive effort will be undertaken to pair water quality sampling with hydrologic sampling under a variety of flow conditions to evaluate loadings of pollutants as well as their instantaneous concentrations at a particular location. This will aid in assessing the relative importance of each source in determining receiving water quality.

REFERENCES

EPA, 1982. (U.S. Environmental Protection Agency) Results of the Nationwide Urban Runoff Program. Volume 2 - Appendices. Water Planning Division, U.S. Environmental Protection Agency.

Ministry of the Environment, 1978. Water Management Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment. MOE Publication.

Ministry of the Environment, 1979. Water Quality Indices of Streams in the MOE Central Region. MOE Publication.

O'Neill, J. E., 1979. Pollution from Urban Land Use in the Grand and Saugeen Watersheds. Task Group C Publication, Pollution from Land Use Activities Reference Group.

Persaud, D. and W. D. Wilkins, 1976. Evaluating Construction Activities Impacting on Water Resources. MOE Publication.

Ralston, J. G. and F. Hamilton, 1978. Chloride Inputs to Lake Ontario and the Significance of Deicing Salts. MOE Publication.

Suns, K., C. Curry, G. A. Rees and G. Crawford, 1981. Organochlorine Declines and their Present Geographic Distribution in Great Lakes Spottail Shiners. MOE Publication.

TABLE 1: LOCATIONS OF STATIONS USED IN WATER, SEDIMENT AND BIOLOGICAL SAMPLE COLLECTION ROUTINE DATA COLLECTION PROGRAM

Routine Station Number	Geographical Location
Mimico Creek:	
82-002	Mimico Creek at Richview Side Road
82-001	Mimico Creek at mouth (Highway 2)
Humber River:	
83-019	Humber River at Bloor Street
83-018	Humber River above Bolton (Albion Hills C. A.)
83-012	Black Creek at mouth (Scarlett Road)
83-005	Humber River at York-Peel County Line, Bolton
83-004	East Humber River at Bridge Pine Grove Road
83-003	Humber River at Highway 7, Woodbridge
83-002	West Humber River at Claireville Dam outlet, Claireville
83-001	Humber River at mouth (Lakeshore Boulevard)
Don River:	
85-014	Don River at Leaside (Pottery Road)
85-013	Don River at Bayview Exit from Don Valley Parkway
85-005	German Mills Creek north of Highway 7 (16th Avenue)
85-004	West Don River at Highway 7, west of Concord
85-003	East Don River above German Mills Creek
85-002	West Don River at Sheppard Avenue
85-001	Don River at mouth (Lakeshore Boulevard)

TABLE 1: LOCATIONS OF STATIONS USED IN WATER, SEDIMENT AND BIOLOGICAL SAMPLE COLLECTION (CONTINUED): TAWMS DATA COLLECTION PROGRAM

Station Number (TAWMS Code)		Geographical Location
Mimico Creek:		
82-003	(12)	Mimico Creek just above mouth (The Queensway)
Humber River:		
83-022	(9)	West Humber River above confluence (Albion Road)
83-021	(8)	East Humber River above confluence (north of Highway 7)
83-020	(7)	Main Humber River above confluence (Highway 27)
83-019	(11)	Humber River at Bloor Street
83-018	(6)	Humber River above Bolton (Albion Hills C. A.)
83-012	(10)	Black Creek at mouth (Scarlett Road)
Don River:		
85-017	(3)	Taylor Creek (Massey Creek) at mouth (Don Valley Parkway)
85-016	(4)	West Don River at confluence (Don Valley Parkway)
85-015	(2)	German Mills Creek at mouth
85-014	(5)	Don River at Leaside (Pottery Road)
85-003	(1)	East Don River above German Mills Creek

TABLE 1: LOCATIONS OF STATIONS USED IN WATER, SEDIMENT AND BIOLOGICAL SAMPLE COLLECTION (CONTINUED)

Fish Sampling Station Number	Geographical Location
Mimico Creek:	
F11	Mimico Creek at mouth (Highway 2)
Humber River:	
F1	Humber River at mouth (Lakeshore Boulevard)
F2	Humber River at Bloor Street
F3	Black Creek at mouth (Scarlett Road)
F4	Humber River at Scarlett Road
F5	Humber River at Finch Avenue
Don River:	
F6	Don River below Bloor Street
F7	Don River at Pottery Road
F8	Don River at West Don R. confluence (Don Mills Road)
F9	Taylor Creek (Massey Creek) at mouth (Don Valley Parkway)
F10	Don River above Taylor Creek

TABLE 2: NUTRIENTS AND ASSOCIATED PHYSICAL/CHEMICAL PARAMETER CONCENTRATIONS IN WATERS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, 1981

Stn.No. (TAWMS Code)	Sample Date	Tot. Phos.	Filt. React. Phos.	Tot. Kjedl	Filt. Amm.	NO_2	NO_3	Turb. FTU	Hard	Alk.	Phenol ug/L	pH S.U.	Temp ^oC	Cond umhos	Field DO	Susp. Solids
82-003(12)	25/09/81	0.038*	0.022	0.49	0.018	0.008	0.590	0.7	267	182	L1	7.7	17.9	1000	8.6	3.4
(Mouth)	01/10/81	0.660*	0.110	1.55	0.010	0.035	0.540	50.0	99	76	5	-	-	345	-	283.0
Guideline		0.030														

*indicates observed concentration exceeds objective or guideline
- = no data; "L" = "less than".
All results in mg/L unless otherwise indicated.

Low flow sample September 25, 1981
Storm flow sample October 1, 1981

TABLE 2 (CONTINUED): NUTRIENTS AND ASSOCIATED PHYSICAL/CHEMICAL PARAMETER CONCENTRATIONS IN WATERS OF THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, 1981

Stn.No. (TAWMS Code)	Sample Date	Tot. Phos.	Filt. React. Phos.	Tot. Kjedl	Filt. Amm.	NO_2	NO_3	Turb. FTU	Hard	Alk.	Phenol ug/L	pH S.U.	Temp °C	Cond umhos	Field DO	Susp. Solids
83-018 (6)	25/09/81	0.028	0.009	0.35	0.020	0.004	0.300	0.8	242	216	L1	8.3	11.5	465	9.4	3.0
(u/s Bolton)	01/10/81	0.028	0.007	0.27	0.020	0.003	0.420	1.5	227	219	L1	7.3	8.0	480	9.4	0.4
83-020 (7)	25/09/81	0.019	0.015	0.32	0.028	0.005	0.065	1.3	193	217	L1	8.5	11.5	460	10.0	6.0
(Hwy 27)	01/10/81	0.070*	0.013	0.42	0.024	0.033	0.430	2.3	225	214	L1	7.4	9.0	520	9.4	4.5
83-021 (8)	25/09/81	0.009	0.002	0.32	0.006	0.001	0.020	1.0	242	243	L1	8.2	12.0	580	9.4	2.3
(n.of Hwy 7)	01/10/81	0.020	0.001	0.30	0.004	0.002	0.045	1.6	267	250	L1	7.3	9.0	620	8.6	0.4
83-022 (9)	25/09/81	0.020	0.009	0.53	0.010	0.001	0.010	0.5	217	157	L1	8.7	15.0	670	10.6	3.0
(Albion Rd)	01/10/81	0.255*	0.055	0.75	0.014	0.015	0.440	71.0	123	110	2	7.8	9.2	370	8.3	96.9
83-012 (10)	25/09/81	0.140*	0.039	1.16	0.560	0.435	1.260	0.8	338	246	L1	7.6	17.9	1420	8.4	4.3
(Black Cr)	01/10/81	0.985*	0.185	1.80	0.010	0.045	0.520	47.0	110	103	7	-	-	350	-	365.0
83-019 (11)	25/09/81	0.020	0.004	0.37	0.038	0.005	0.015	1.0	214	191	L1	7.8	17.0	620	8.3	8.3
(Bloor St)	01/10/81	0.620*	0.040	2.10	0.328	0.043	0.145	29.0	134	110	5	-	-	400	-	308.0
Guideline		0.030														

*indicates observed concentration exceeds objective or guideline
- = no data; "L" = "less than".
All results in mg/L unless otherwise indicated.

Low flow sample September 25, 1981
Storm flow sample October 1, 1981

TABLE 2 (CONTINUED): NUTRIENTS AND ASSOCIATED PHYSICAL/CHEMICAL PARAMETER CONCENTRATIONS IN WATERS OF THE DON RIVER: TAWMS SAMPLING PROGRAM, 1981

Stn.No. (TAWMS Code)	Sample Date	Tot. Phos.	Filt. React. Phos.	Tot. Kjedl	Filt. Amm.	NO_2	NO_3	Turb. FTU	Hard	Alk.	Phenol ug/L	pH S.U.	Temp °C	Cond umhos	Field DO	Susp. Solids
85-003 (1)	25/09/81	0.385*	0.360	0.90	-	0.005	4.350	1.4	277	244	6	7.4	13.0	750	7.8	7.8
(abv G.M.Cr)	01/10/81	1.150*	0.250	2.75	0.006	0.006	0.970	25.0	160	209	147	8.0	9.5	540	7.9	227.0
85-015 (2)	25/09/81	0.766*	0.610	4.15	L.002	0.014	9.140	7.8	278	221	L1	7.9	13.5	900	8.8	24.3
(Germ.M.Cr)	01/10/81	1.250*	0.225	2.75	0.410	0.031	1.070	30.0	134	198	9	7.8	9.5	410	8.4	668.0
85-017 (3)	25/09/81	0.127*	0.074	0.73	0.058	0.080	3.260	1.2	294	232	-	6.9	16.6	960	8.7	10.5
(Taylor Cr)	01/10/81	0.695*	0.150	1.45	0.004	0.028	1.270	32.0	119	114	23	-	-	405	-	237.0
85-016 (4)	25/09/81	0.054*	0.026	0.52	0.070	0.036	1.210	1.6	285	225	L1	7.7	15.8	920	8.6	6.5
(Don V. Pkwy)	01/10/81	0.875*	0.155	1.65	0.006	0.012	1.390	19.0	122	116	6	-	-	420	-	283.0
85-014 (5)	25/09/81	0.650*	0.180	5.10	L.002	0.002	2.100	1.7	262	223	5	7.8	16.4	920	8.7	29.5
(Pottery Rd)	01/10/81	0.895*	0.160	2.30	L.002	0.004	1.900	31.0	138	149	10	-	-	470	-	338.0
Guideline		0.030														

*indicates observed concentration exceeds objective or guideline
- = no data; "L" = "less than".
All results in mg/L unless otherwise indicated.

Low flow sample September 25, 1981
Storm flow sample October 1, 1981

TABLE 3. UN-IONIZED AMMONIA CONCENTRATIONS IN WATERS OF THE DON AND HUMBER RIVERS AND MIMICO CREEK, 1978-80: ROUTINE MONITORING PROGRAM

Mimico Creek:

Station Number	Richview 82-002	Mouth 82-001
Mean	0.004	0.003
Maximum	0.018	0.016
Minimum	0.000	0.000
Std. Deviation	0.004	0.004
N	27	27
% Exceeding Objective	0	0

Humber River:

Station Number	Bolton 83-018	York-Peel 83-005	BrPineGr 83-004	Hwy 7 83-003	Dam Outlt 83-002	Black Cr 83-012	Mouth 83-001
Mean	0.000	0.006	0.001	0.002	0.003	0.018	0.004
Maximum	0.002	0.029	0.003	0.008	0.010	0.063	0.011
Minimum	0.000	0.000	0.000	0.000	0.000	0.002	0.001
Std. Deviation	0.000	0.007	0.001	0.002	0.002	0.016	0.002
N	21	26	21	27	21	28	21
% Exceeding Objective	0	8	0	0	0	31	0

Don River:

Station Number	Hwy 7 85-004	Shep'rd 85-002	G.M.Cr. 85-005	abvGMCr 85-003	DVPkwy 85-013	Mouth 85-001
Mean	0.003	0.004	0.281	0.013	0.041	0.035
Maximum	0.011	0.021	7.396	0.080	0.120	0.108
Minimum	0.000	0.001	0.000	0.000	0.003	0.007
Std. Deviation	0.003	0.004	1.369	0.018	0.033	0.025
N	26	21	29	29	29	17
% Exceeding Objective	0	7	38	17	66	72

All results are in mg/L (ppm).

TABLE 4: TRACE METAL AND NUTRIENT CONCENTRATIONS IN SURFACE BED SEDIMENTS, HUMBER RIVER AND DON RIVER: ROUTINE MONITORING, 1980

Station (Year)	Cd ug/g	Hg ug/g	Cu ug/g	Cr ug/g	Zn ug/g	Pb ug/g	LOI** %	TKN %	T. Phos %
Humber River:									
83-001 (1980) (Mouth)	3.3*	0.35*	85*	78*	410*	240*	9.0*	2.8*	1.1*
Don River:									
85-001 (1980) (Mouth)	8.4*	0.28	150*	140*	660*	380*	0.7	2.5*	1.7*
Guidelines	1.0	0.3	25	25	100	50	6.0	0.2	0.1

* concentration exceeds MOE guidelines for the open water disposal of dredged material (Persaud and Wilkins, 1976)

** LOI indicates percent loss on ignition (an indication of the organic content of a sediment sample).

TABLE 5: TRACE METAL AND NUTRIENT CONCENTRATIONS AND PARTICLE SIZE ANALYSES OF SURFACE BED SEDIMENTS IN MIMICO CREEK: TAWMS SAMPLING PROGRAM, 1981

Station No.	TAWMS Code	Cd ug/g	Hg ug/g	Cu ug/g	Cr ug/g	Zn ug/g	Pb ug/g	LOI** %	TOC** ug/g	TKN %	T.Phos %	COD ug/g	Clay % L.004	Silt % .004-.06	Sand % .06-.5	Sand % .5-2	Grav. % 2-50
82-003 (Mouth)	(12)	0.3	L0.01	14.0	20.0	56.0	11.0	1.2	2700	0.2	0.6*	15000	-	1	11	46	42
Guideline		1.0	0.30	25.0	25.0	100.0	50.0	6.0	-	0.2	0.1	50000					

* Indicates that concentration is in excess of suggested guidelines (Persaud and Wilkins, 1976).

** LOI indicates percent loss on ignition (an indication of the organic content of a sediment sample).
TOC indicates total organic carbon content.

"Surface bed sediment" refers to the top 5 cm depth of sediment in the stream bed.

Particle size classes are measured in mm: results are reported as percent of total sample weight in each class.

"L" = "less than".

TABLE 5 (CONTINUED): TRACE METAL AND NUTRIENT CONCENTRATIONS AND PARTICLE SIZE ANALYSES OF SURFACE BED SEDIMENTS IN THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, 1981

Station No.	TAWMS Code	Cd ug/g	Hg ug/g	Cu ug/g	Cr ug/g	Zn ug/g	Pb ug/g	LOI** %	TOC** ug/g	TKN %	T.Phos %	COD ug/g	Clay % L.004	Silt % .004-.06	Sand % .06-.5	Sand % .5-2	Grav. % 2-50
83-018 (Bolton)	(6)	L0.3	L0.01	3.3	7.0	12.0	5.5	1.7	5200	0.5*	0.4*	18000	-	6	63	19	12
83-020 (Hwy 27)	(7)	0.3	L0.01	6.5	8.5	16.0	3.5	0.6	2000	0.2	0.6*	23000	-	6	58	25	11
83-021 (n of Hwy 7)	(8)	L0.3	L0.01	9.5	7.5	19.0	5.3	1.0	8000	0.4*	0.6*	26000	3	11	35	12	39
83-022 (Albion Rd)	(9)	L0.3	L0.01	15.0	12.0	51.0	19.0	1.0	5200	0.3*	0.6*	23000	-	-	10	25	65
83-012 (Black Cr)	(10)	0.4	L0.01	17.0	15.0	70.0	200.0*	0.8	3400	0.3*	0.5*	14000	-	-	15	48	37
83-001 (Mouth)		1.2*	0.11	47.0*	55.0*	250.0*	150.0*	5.4	24000	1.6*	1.1*	89000*	40	52	4	1	1
Guideline		1.0	0.30	25.0	25.0	100.0	50.0	6.0	-	0.2	0.1	50000					

* Indicates that concentration is in excess of suggested guidelines (Persaud and Wilkins, 1976).

** LOI indicates percent loss on ignition (an indication of the organic content of a sediment sample).
TOC indicates total organic carbon content.

"Surface bed sediment" refers to the top 5 cm depth of sediment in the stream bed.

Particle size classes are measured in mm: results are reported as percent of total sample weight in each class.

"L" = "less than".

TABLE 5 (CONTINUED): TRACE METAL AND NUTRIENT CONCENTRATIONS AND PARTICLE SIZE ANALYSES OF SURFACE BED SEDIMENTS IN THE DON RIVER: TAWMS SAMPLING PROGRAM, 1981

Station No.	TAWMS Code	Cd ug/g	Hg ug/g	Cu ug/g	Cr ug/g	Zn ug/g	Pb ug/g	LOI** %	TOC** ug/g	TKN %	T.Phos %	COD ug/g	Clay % L.004	Silt % .004-.06	Sand % .06-.5	Sand % .5-2	Grav. % 2-50
85-003 (abv G.M. Cr)	(1)	L0.3	L0.01	5.8	8.5	25.0	11.0	0.6	6200	0.2	0.5*	19000	-	2	42	21	35
85-015 (Germ. M. Cr)	(2)	L0.3	L0.01	5.0	5.0	22.0	3.5	0.6	2700	0.2	0.5*	5200	-	2	56	29	13
85-017 (Taylor Cr)	(3)	L0.3	L0.01	7.2	7.5	30.0	9.0	0.7	3300	0.2	0.3*	16000	-	-	40	57	3
85-016 (Don V. Pkwy)	(4)	0.4	L0.01	6.5	5.8	29.0	11.0	0.7	3000	0.1	0.3*	12000	-	-	42	35	23
85-001 (Mouth)		0.6	0.08	8.5	9.0	42.0	10.0	0.5	2900	0.2	0.6*	13000	-	-	88	12	-
Guideline		1.0	0.30	25.0	25.0	100.0	50.0	6.0	-	0.2	0.1	50000					

* Indicates that concentration is in excess of suggested guidelines (Persaud and Wilkins, 1976).

** LOI indicates percent loss on ignition (an indication of the organic content of a sediment sample).
TOC indicates total organic carbon content.

"Surface bed sediment" refers to the top 5 cm depth of sediment in the stream bed.

Particle size classes are measured in mm: results are reported as percent of total sample weight in each class.

"L" = "less than".

TABLE 6: NUTRIENTS AND ASSOCIATED PHYSICAL/CHEMICAL PARAMETER CONCENTRATIONS IN SEWAGE TREATMENT PLANT EFFLUENTS: TAWMS SAMPLING PROGRAM, SEPTEMBER 25 AND OCTOBER 1, 1981.

Plant	Sample Date	Tot. Phos.	Filt. React. Phos.	Tot. Kjedl	Filt. Amm.	NO_2	NO_3	Turb. FTU	Hard	Alk.	Phenol	pH S.U.	Temp °C	Cond. umhos	Susp. Solids	Chloride
Humber River:																
Bolton	25/09/81	0.09	0.03	0.95	0.044	0.001	17.000	0.9	225	122	L1	7.9	15.5	1300	0.5	208
	01/10/81	0.19	0.12	1.70	L.002	1.600	19.700	0.6	267	104	1	7.0	16.0	1550	5.7	-
Kleinburg **	25/09/81	5.14	4.40	3.35	1.05	2.950	15.500	3.5	311	223	1	7.4	16.0	1600	11.6	308
	01/10/81	17.80	12.00	43.30	6.15	0.455	0.055	38.0	337	330	3	7.6	15.5	1900	25.8	-
Don River:																
Pugsley	25/09/81	2.21	1.60	9.05	1.08	4.800	15.200	5.7	171	118	1	7.1	15.0	1000	15.1	143
	01/10/81	4.90	4.90	16.10	1.79	8.400	10.85	6.3	175	168	2	7.3	17.0	1050	57.2	-
North Don	25/09/81	2.91	0.20	18.60	10.80	3.850	L.005	5.8	236	251	3	7.4	17.0	1000	27.2	147
	01/10/81	3.49	-	23.80	20.70	0.075	26.400	4.8	184	264	L1	7.4	15.5	1100	53.9	-
John St.	01/10/81*	10.70	7.70	16.90	0.54	0.110	9.140	13.2	204	121	3	7.2	17.0	890	444.0	-
North Toronto	25/09/81	2.91	0.29	24.10	19.00	0.006	0.210	22.0	186	213	24	7.3	19.0	900	60.5	135
	01/10/81	1.36	0.33	19.30	13.80	8.400	29.600	2.9	196	185	10	7.3	17.0	880	160.0	-

- = no data; "L" = "less than".
All results are in mg/L (ppm) unless otherwise specified
* No data were available for the John Street Plant for September 25, 1981.
** The Kleinburg plant is not required to have phosphorus removal to 1 mg/L for its effluent because its design capacity is less than 1 mgd.

Note: High total phosphorus values observed for Don River plants may be misleading. At the time of sampling, these plants were being phased out of operation (see text, page 3) and therefore stocks of phosphorus-removal chemicals were not replenished when exhausted. In most cases, the supplies of chemicals had run out by September 24, 1981. A second problem arises in that the data presented here represent only single grab samples and may differ significantly from the weighted composite samples routinely obtained by plant operators.

TABLE 7: TRACE METAL CONCENTRATIONS IN THE HUMBER AND DON RIVERS: ROUTINE MONITORING, 1978-1980

Parameter	Station Number			
	Humber River		Don River	
	83-019* (Bloor St.)	83-001 (Mouth)	85-014* (Pottery Rd)	85-001 (Mouth)
LEAD:				
Median:	L30	L30	L30	L30
Maximum:	100	250	180	320
Minimum:	L30	L30	L30	L30
N:	52	48	48	36
% Exceeding Objective of 25 ug/L	28	13	23	22
COPPER:				
Median:	L10	L10	10	20
Maximum:	50	90	60	120
Minimum:	L10	L10	L10	L10
N:	49	46	45	33
% Exceeding Objective of 5 ug/L	22	44	60	55
ZINC:				
Median:	90**	20	150**	40
Maximum:	NA	340	NA	500
Minimum:	NA	L10	NA	L10
N:	1	34	1	36
% Exceeding Objective of 30 ug/L	NA	26	NA	56
CADMIUM:				
Median:	L5.0	L5.0	L5.0	L5.0
Maximum:	50.0	30.0	40.0	13.0
Minimum:	L5.0	L5.0	L5.0	L5.0
N:	52	46	48	33
% Exceeding Objective of 0.2 ug/L	2	11	4	21
MERCURY:				
Median:	0.02	L0.03	0.04	0.04
Maximum:	0.08	0.27	0.45	0.27
Minimum:	L0.02	L0.02	L0.02	L0.02
N:	51	52	48	37
% Less Than Detection Limit of 0.03 ug/' (ppb)	60	36	18	11

L=Less than
*-no 1978 data
**-one sample collected on March 18, 1980
All results are in ug/L (ppb).

TABLE 8: TRACE METAL CONCENTRATIONS IN WATERS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, 1981

Stn. No. (TAWMS Code)	Sampling Date	Cu	Zn	Cd	Cr	Pb	Hg
		ug/L					
Mimico Creek:							
82-003 (12)	25/09/81	8*	10	L.2	19	L3	L.04
(Mouth)	01/10/81	27*	160*	1.0*	18	120*	0.06
Objective		5	30	0.2	100	25	

*indicates observed concentration exceeds objective or guideline
- = no data; "L" = "less than".

Low flow sample September 25, 1981
Storm flow sample October 1, 1981

TABLE 8 (CONTINUED): TRACE METAL CONCENTRATIONS IN WATERS OF THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, 1981

Stn. No. (TAWMS Code)	Sampling Date	Cu	Zn	Cd	Cr	Pb	Hg
		ug/L					
Humber River:							
83-018 (6)	25/09/81	2	2	L0.2	4	L3	L.06
(u/s Bolton)	01/10/81	5	2	L0.1	2	3	L.05
83-020 (7)	25/09/81	3	1	L0.2	L2	L3	L.06
(Hwy. 27)	01/10/81	5	3	0.1	2	L3	L.05
83-021 (8)	25/09/81	3	L1	L0.2	L2	L3	L.04
(n of Hwy 7)	01/10/81	8*	2	0.1	2	4	L.05
83-022 (9)	25/09/81	8*	3	0.1	3	3	L.04
(Albion Rd)	01/10/81	13*	55*	0.7*	10	36*	L.05
83-012 (10)	25/09/81	26*	60*	0.3*	22	L3	L.04
(Black Cr)	01/10/81	92*	270*	3.4*	36	250*	0.10
83-019 (11)	25/09/81	5	5	L.2	6	L3	L.04
(Bloor St)	01/10/81	25*	130*	1.2*	17	130*	0.07
Objective		5	30	0.2	100	25	

*indicates observed concentration exceeds objective or guideline
- = no data; "L" = "less than".

Low flow sample September 25, 1981
Storm flow sample October 1, 1981

TABLE 8 (CONTINUED): TRACE METAL CONCENTRATIONS IN WATERS OF THE DON RIVER: TAWMS SAMPLING PROGRAM, 1981

Stn. No. (TAWMS Code)	Sampling Date	Cu	Zn	Cd	Cr	Pb	Hg
		ug/L					
Don River:							
85-003 (1)	25/09/81	5	11	L.2	L2	15	L.06
(abv G.M. Cr)	01/10/81	24*	120*	1.1	23	100*	0.16
85-015 (2)	25/09/81	11*	28	L.2	40	L3	L.06
(Germ. M. Cr)	01/10/81	96*	190*	12.0*	24	87*	0.06
85-017 (3)	25/09/81	8*	11	L.2	8	L3	L.04
(Taylor Cr)	01/10/81	42*	170*	0.9*	12	130*	0.05
85-016 (4)	25/09/81	11*	10	L.2	30	L3	L.04
(Don V. Pkwy)	01/10/81	38*	150*	0.6*	18	120	0.05
85-014 (5)	25/09/81	18*	14	L.2	11	3	L.04
(Pottery Rd)	01/10/81	36*	140*	0.6*	12	140*	0.08
Objective		5	30	0.2	100	25	

*indicates observed concentration exceeds objective or guideline
- = no data; "L" = "less than".

Low flow sample September 25, 1981
Storm flow sample October 1, 1981

TABLE 9: TRACE METAL CONCENTRATIONS IN SEWAGE TREATMENT PLANT EFFLUENTS: TAWMS SAMPLING PROGRAM, SEPTEMBER 25 AND OCTOBER 1, 1981.

Plant	Sample Date	Cu	Zn	Cd	Cr	Pb	Hg
		ug/L					
Humber River:							
Bolton	25/09/81	6*	24	0.2	3	3	0.06
	01/10/81	14*	61*	L.1	8	11	L.05
Kleinburg	25/09/81	14*	320*	0.4*	2	9	L.06
	01/10/81	280*	160*	0.7*	12	L3	0.55
Don River:							
Pugsley	25/09/81	110*	120*	0.8*	15	5	L.06
	01/10/81	2400*	250*	2.1*	37	27*	0.06
North Don	25/09/81	45*	67*	0.9*	24	31*	0.12
	01/10/81	54*	100*	0.2	61	210*	0.10
John St.	01/10/81*	380*	350*	2.6*	32	25	0.58
North Toronto	25/09/81	45*	67*	0.9*	24	31*	0.12
	01/10/81	28*	37*	0.3*	12	19	L.05
Objective		5	30	0.2	100	25	

- = no data; "L" = "less than".

* No data were available for the John Street Plant for September 25, 1981.

TABLE 10: TRACE CONTAMINANT CONCENTRATIONS IN WATERS OF THE HUMBER AND DON RIVERS: ROUTINE MONITORING, 1978-80.

Station No.	Humber River 83-018 (Bolton)	83-019 (Bloor St)	83-001 (Mouth)	85-002 (Sheppard)	Don River 85-014 (Pott'y Rd)	85-013 (DVP)	85-001 (Mouth)
PCB							
Median	L20	L20	L20	L20	L20	L20	L20
Maximum	L20	230	320	21	570	150	1400
Minimum	L20	L20	L20	L20	L20	L20	L20
N	10	60	52	7	60	15	36
% Exceeding Objective of 1 ng/L (Detection Limit 20 ng/L)	0	33	40	14	43	53	47
PCP							
Median	-	60	L50	-	130	L50	-
Maximum	-	830	320	-	2000	4030	-
Minimum	-	L50	L50	-	L50	L50	-
N	-	38	13	-	33	12	-
(Detection Limit 50 ng/L)							
2,4,5-T							
Median	-	L50	L50	-	L50	L50	-
Maximum	-	300	120	-	110	250	-
Minimum	-	L50	L50	-	L50	L50	-
N	-	36	12	-	33	12	-
(Detection Limit 50 ng/L)							

"-" indicates no data are available; "L" indicates "less than".

All results are in ng/L (ppt).

TABLE 11: PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN FILTERED WATER FROM MIMICO CREEK: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
82-003(12) (mouth)	13.8*	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit***	5	.25	.25	.25	.25	.25	.25	.25	.25	.5	.5	.5	.25	.25	.25	1	.5	1	1	.25	.5	1
Objective	1		1	1	(3)	1			10	(------60------)			(-------3-------)			40	(------3-------)			1	1	2

* results exceed objectives or guidelines for unfiltered water.
ND = not detected
** PP = para para OP = ortho para DDE and DDD are metabolites of DDT
Chlor = Chlordane DMDT = methoxychlor Thio = Thiodan
Thio S = Thiodan sulphate Thiodan 1, 2, and S = Endosulfan Hept Epox = Heptachlor Epoxide
*** note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

All results reported as ng/L (ppt).

An objective value in parentheses indicates a concentration which the sum of all related compounds (i.e., DDT and its metabolites or all forms of Chlordane) should not exceed.

TABLE 11 (CONTINUED): PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN FILTERED WATER FROM HUMBER RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
83-018(6) (Bolton)	ND	ND	ND	ND	ND	ND	2.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-020(7) (Hwy 27)	ND	ND	ND	ND	ND	ND	4.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	ND
83-021(8) (n of Hwy 7)	ND	ND	ND	ND	ND	ND	2.0	ND	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-022(9) (Albion Rd)	ND	ND	ND	ND	ND	ND	3.2	ND	ND	1.5	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.5*	ND
83-012(10) (Black Cr)	7.7*	ND	ND	ND	0.3	ND	49.7	ND	5.7	ND	ND	ND	ND	ND	ND	ND	0.8	ND	ND	0.8	1.5*	ND
83-019(11) (Bloor St)	8.8*	0.5	ND	ND	ND	ND	42.9	0.7	8.4	0.8	0.6	ND	ND	ND	ND	ND	1.7	1.1	ND	1.6*	2.6*	ND
Detection Limit***	5	.25	.25	.25	.25	.25	.25	.25	.25	.5	.5	.5	.25	.25	.25	1	.5	1	1	.25	.5	1
Objective	1		1	1	(3)	1			10	(------60------)			(-------3-------)			40	(------3-------)			1	1	2

* results exceed objectives or guidelines for unfiltered water.
ND = not detected All results reported as ng/L (ppt).
** PP = para para OP = ortho para DDE and DDD are metabolites of DDT
chlor = chlordane DMDT = methoxychlor Thio = thiodan
Thio S = Thiodan sulphate Thiodan 1, 2, and S = Endosulfan Hept Epox = Heptachlor Epoxide
*** note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.
An objective value in parentheses indicates a concentration which the sum of all related compounds (i.e., DDT and its metabolites or all forms of chlordane) should not exceed.

TABLE 11 (CONTINUED): PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN FILTERED WATER FROM DON RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
85-003(1) (abv G.M. Cr)	18.4*	11.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-015(2) (Germ. M. Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-017(3) (Taylor Cr)	80.5*	13.2	ND	ND	5.1*	ND	6.2	2.5	2.7	2.5	2.4	ND	ND	ND	ND	ND	2.7	ND	ND	ND	1.0	1.5*
85-016(4) (Don V. Pkwy)	93.3*	19.0	ND	ND	3.2*	ND	6.5	ND	6.2	3.7	2.7	ND	ND	ND	ND	ND	1.5	ND	2.8	ND	1.2*	4.5*
85-014 (5) (Pottery Rd)	ND	ND	ND	ND	ND	ND	39.6	0.4	14.9*	0.9	0.8	ND	ND	ND	ND	ND	0.9	ND	ND	2.1*	3.6*	ND
Detection Limit***	5	.25	.25	.25	.25	.25	.25	.25	.25	.5	.5	.5	.25	.25	.25	1	.5	1	1	.25	.5	1
Objective	1		1	1	(3)	1			10	(------60------)			(-------3-------)			40	(------3-------)			1	1	2

* results exceed objectives or guidelines for unfiltered water.
ND = not detected All results reported as ng/L (ppt).
** PP = para para OP = ortho para
chlor = chlordane DMDT = methoxychlor
Thio S = Thiodan sulphate Thiodan 1, 2, and S = Endosulfan
DDE and DDD are metabolites of DDT
Thio = thiodan
Hept Epox = Heptachlor Epoxide
*** note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.
An objective value in parentheses indicates a concentration which the sum of all related compounds (i.e., DDT and its metabolites or all forms of chlordane) should not exceed.

TABLE 12: CARBAMATE CONCENTRATIONS IN WATERS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1982

Stn.No. (TAWMS Code)	Carbofuran 3-HO	Propoxur	Carbofuran	Carbaryl	IPC	Aminocarb	CIPC	Eptam	Benomyl	Bux	Barban	Butylate	Diallate	Captan
82-003 (12) (Mouth)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit*	25	50	25	25	50	50	25	50	50	100	100	100	50	100

ND = not detected
All results reported as ng/L (ppt)
- = no data
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 12 (CONTINUED): CARBAMATE CONCENTRATIONS IN WATERS OF THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1982

Stn.No. (TAWMS Code)	Carbofuran 3-HO	Propoxur	Carbofuran	Carbaryl	IPC	Aminocarb	CIPC	Eptam	Benomyl	Bux	Barban	Butylate	Diallate	Captan
83-018 (6) (Bolton)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-020 (7) (Hwy 27)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-021 (8) (n of Hwy 7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-022 (9) (Albion Rd)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-012 (10) (Black Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-019 (11) (Bloor St)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit*	25	50	25	25	50	50	25	50	50	100	100	100	50	100

ND = not detected
All results reported as ng/L (ppt)
- = no data
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 12 (CONTINUED): CARBAMATE CONCENTRATIONS IN WATERS OF THE DON RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1982

Stn.No. (TAWMS Code)	Carbofuran 3-HO	Propoxur	Carbofuran	Carbaryl	IPC	Aminocarb	CIPC	Eptam	Benomyl	Bux	Barban	Butylate	Diallate	Captan
85-003 (1) (abv G.M. Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-015 (2) (Germ.M. Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-017 (3) (Taylor Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-016 (4) (Don V. Pkwy)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85-014 (5) (Pottery Rd)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit*	25	50	25	25	50	50	25	50	50	100	100	100	50	100

ND = not detected
All results reported as ng/L (ppt)
- = no data
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 13: ORGANOPHOSPHATE PESTICIDE CONCENTRATIONS IN WATERS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station No.	(TAWMS Code)	Dichlorvos	Phorate	Mevinphos	Diazinon	Ronnel	Parathion	Methyl Parathion	Ethion	Methyl Trithion	Guthion
82-003 (Mouth)	(12)	-	-	-	-	-	-	-	-	-	-
Detection Limit*		.002	.002	.002	.002	.002	.002	.002	.002	.002	.2
Objective					0.08						

- = no data
ND = not detected
All results reported as ug/L (ppb)
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 13 (CONTINUED): ORGANOPHOSPHATE PESTICIDE CONCENTRATIONS IN WATERS OF HUMBER RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station No.	(TAWMS Code)	Dichlorvos	Phorate	Mevinphos	Diazinon	Ronnel	Parathion	Methyl Parathion	Ethion	Methyl Trithion	Guthion
83-018 (Bolton)	(6)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-020 (Hwy 27)	(7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-021 (n of Hwy 7)	(8)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-022 (Albion Rd)	(9)	ND	ND	ND	0.004	ND	ND	ND	ND	ND	ND
83-012 (Black Cr)	(10)	ND	ND	ND	0.004	ND	ND	ND	ND	ND	ND
83-019 (Bloor St)	(11)	ND	ND	ND	0.007	ND	ND	ND	ND	ND	ND
Detection Limit*		.002	.002	.002	.002	.002	.002	.002	.002	.002	.2
Objective					0.08						

- = no data
ND = not detected
All results reported as ug/L (ppb)
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 13 (CONTINUED): ORGANOPHOSPHATE PESTICIDE CONCENTRATIONS IN WATERS OF DON RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station No. (TAWMS Code)	Dichlorvos	Phorate	Mevinphos	Diazinon	Ronnel	Parathion	Methyl Parathion	Ethion	Methyl Trithion	Guthion
85-003 (1) (abv G.M. Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-015 (2) (Germ. M. Cr)	ND	ND	ND	0.030	ND	ND	ND	ND	ND	ND
85-017 (3) (Taylor Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-016 (4) (Don V. Pkwy)	-	-	-	-	-	-	-	-	-	-
85-014 (5) (Pottery Rd)	ND	ND	ND	0.007	ND	ND	ND	ND	ND	ND
Detection Limit*	.002	.002	.002	.002	.002	.002	.002	.002	.002	.2
Objective				0.08						

- = no data
ND = not detected
All results reported as ug/L (ppb)
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 14: TRIAZINE HERBICIDE CONCENTRATIONS IN WATERS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station Number (TAWMS Code)	Propazine	Atrazine	Simazine	Sencor	Bladex	Prometone	Ametryne	Prometryne
82-003 (12) (mouth)	-	-	-	-	-	-	-	-
Detection Limit*	.01	.01	.01	.025	.005	.01	.01	.01
Objective			10					

- = no data
ND = not detected
All results reported as ug/L (ppb)
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 14 (CONTINUED): TRIAZINE HERBICIDE CONCENTRATIONS IN WATERS OF THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station Number (TAWMS Code)	Propazine	Atrazine	Simazine	Sencor	Bladex	Prometone	Ametryne	Prometryne
83-018 (6) (Bolton)	ND	ND	ND	ND	ND	ND	ND	ND
83-020 (7) (Hwy 27)	ND	ND	ND	ND	ND	ND	ND	ND
83-021 (8) (N of Hwy 7)	ND	ND	ND	ND	ND	ND	ND	ND
83-022 (9) (Albion Rd)	ND	0.23	ND	ND	ND	ND	ND	ND
83-012 (10) (Black Cr)	ND	0.07	4.4	ND	ND	ND	ND	ND
83-019 (11) (Bloor St)	ND	ND	1.3	ND	ND	ND	ND	ND
Detection Limit*	.01	.01	.01	.025	.005	.01	.01	.01
Objective			10					

- = no data
ND = not detected
All results reported as ug/L (ppb)
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 14 (CONTINUED): TRIAZINE HERBICIDE CONCENTRATIONS IN WATERS OF THE DON RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station Number (TAWMS Code)	Propazine	Atrazine	Simazine	Sencor	Bladex	Prometone	Ametryne	Prometryne
85-003 (1) (abv G.M. Cr)	ND	0.35	ND	ND	ND	ND	ND	ND
85-015 (2) (Germ. M. Cr)	ND	0.09	ND	ND	ND	ND	ND	ND
85-017 (3) (Taylor Cr)	ND	ND	ND	ND	ND	ND	ND	ND
85-016 (4) (Don V. Pkwy)	-	-	-	-	-	-	-	-
85-014 (5) (Pottery Rd)	ND	0.06	ND	ND	ND	ND	ND	ND
Detection Limit*	.01	.01	.01	.025	.005	.01	.01	.01
Objective			10					

- = no data
ND = not detected
All results reported as ug/L (ppb)
* Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 15: CHLOROPHENOXY/CHLOROBENZOIC ACID HERBICIDE CONCENTRATIONS IN WATERS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981

Station Number	(TAWMS Code)	Dicamba	2,4-DP	2,4-D	Silvex	2,4-DB	Pichloram	2,4,6-T	2,4,5-T	2,3,4-T	2,3,5,6-T	2,3,4,5-T	PCP
82-003 (mouth)	(12)	-	-	-	-	-	-	-	-	-	-	-	-
Detection Limit**		0.025	0.025	0.025	0.01	0.01	0.025	0.01	0.01	0.02	0.01	0.01	0.01
Objective		200		4.									

- = no data
ND = not detected.
* = observed concentration exceeds objective.
All data reported as ug/L (ppb).
**Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 15 (CONTINUED): CHLOROPHENOXY/CHLOROBENZOIC ACID HERBICIDE CONCENTRATIONS IN WATERS OF THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station Number	(TAWMS Code)	Dicamba	2,4-DP	2,4-D	Silvex	2,4-DB	Pichloram	2,4,6-T	2,4,5-T	2,3,4-T	2,3,5,6-T	2,3,4,5-T	PCP
83-018 (Bolton)	(6)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-020 (Hwy 27)	(7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-021 (n of Hwy 7)	(8)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-022 (Albion Rd)	(9)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10
83-012 (Black Cr)	(10)	ND	0.18	0.18	ND	ND	ND	ND	ND	ND	ND	ND	0.70*
83-019 (Bloor St)	(11)	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.03	ND	0.52*
Detection Limit**		0.025	0.025	0.025	0.01	0.01	0.025	0.01	0.01	0.02	0.01	0.01	0.01
Objective		200		4.									

- = no data
ND = not detected.
* = observed concentration exceeds objective.
All data reported as ug/L (ppb).
** Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 15 (CONTINUED): CHLOROPHENOXY/CHLOROBENZOIC ACID HERBICIDE CONCENTRATIONS IN WATERS OF THE DON RIVER: TAWMS SAMPLING PROGRAM, OCTOBER 1, 1981.

Station Number (TAWMS Code)	Dicamba	2,4-DP	2,4-D	Silvex	2,4-DB	Pichloram	2,4,6-T	2,4,5-T	2,3,4-T	2,3,5,6-T	2,3,4,5-T	PCP
85-003 (1) (abv G.M. Cr)	0.06	0.18	1.13	ND	ND	ND	ND	ND	ND	0.06	ND	2.0*
85-015 (2) (Germ. M. Cr)	0.39	1.13	18.0*	ND	ND	ND	ND	ND	ND	ND	ND	0.09
85-017 (3) (Taylor Cr)	ND	0.2	0.05	ND	ND	ND	ND	ND	ND	ND	ND	0.45*
85-016 (4) (Don V. Pkwy)	-	-	-	-	-	-	-	-	-	-	-	-
85-014 (5) (Pottery Rd)	0.03	0.27	0.05	ND	ND	ND	ND	ND	ND	ND	ND	0.20
Detection Limit**	0.025	0.025	0.025	0.01	0.01	0.025	0.01	0.01	0.02	0.01	0.01	0.01
Objective	200		4.									

- = no data
ND = not detected.
* = observed concentration exceeds objective.
All data reported as ug/L (ppb).
** Note that detection limits are exceptionally low for these TAWMS samples because of very high volume samples.

TABLE 16: PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN SURFACE BED SEDIMENTS FROM THE HUMBER AND DON RIVERS: ROUTINE MONITORING, 1980

Contaminant / Station (Year) Number	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
Humber River:																						
83-001 (1980) (Mouth)	264*	ND	ND	ND	4	ND	2	ND	-	11	16	-	6	13	ND	-	3	ND	-	5	ND	ND
Don River:																						
85-001 (1980) (mouth)	95*	ND	ND	ND	3	ND	15	ND	-	31	41	-	10	38	ND	-	ND	ND	-	13	6	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4
Guideline	50																					

* Results exceed MOE guidelines for the open water disposal of dredged material (Persaud and Wilkins, 1976).

** ND = not detected; "-" = no data; All results reported as ug/kg (ppb)
PP = para para; OP = ortho para; DDE and DDD are metabolites of DDT
Chlor = Chlordane; DMDT = methoxychlor; Thio = Thiodan
Thio S = Thiodan sulphate; Thiodan 1, 2, and S = Endosulfan; Hept Epox = Heptachlor Epoxide

An objective value in parentheses indicates a concentration which the sum of all related compounds (i.e., DDT and its metabolites or all forms of Chlordane) should not exceed.

TABLE 17: PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN SURFACE BED SEDIMENTS OF MIMICO CREEK: TAWMS SAMPLING PROGRAM, 1981.

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
Stn. TAWMS No. Code																						
82-003(12) (mouth)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4
Guideline	50																					

ND = not detected
All results are reported as ng/g (ppb)
* Exceeds MOE guidelines for the open water disposal of dredged material (Persaud and Wilkins, 1976)
** PP = para para OP = ortho para DDE and DDD are metabolites of DDT
Chlor = Chlordane DMDT = methoxychlor Thio = Thiodan
Thio S = Thiodan sulphate Thiodan 1, 2, and S = Endosulfan Hept Epox = Heptachlor Epoxide
"Surface bed sediment" refers to the top 5 cm depth of sediment in the stream bed.

TABLE 17 (CONTINUED): PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN SURFACE BED SEDIMENTS OF THE HUMBER RIVER: TAWMS SAMPLING PROGRAM, 1981.

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PPDDE	MIREX	αBHC	βBHC	γBHC	αCHLOR	γCHLOR	OXYCHLOR	OPDDD	PPDDD	PPDDT	DMDT	THIO 1	THIO 2	THIO S	HEPTEPOX	DIELDRIN	ENDRIN
Stn. TAWMS No. Code																						
83-018 (6) (Bolton)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-020 (7) (Hwy 27)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	ND
83-021 (8) (n of Hwy 7)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND	ND
83-022 (9) (Albion Rd)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	5	1	ND	ND
83-012(10) (Black Cr)	25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
83-001 (Mouth)	360*	ND	ND	ND	ND	ND	1	ND	1	8	8	ND	ND	6	6	ND	2	ND	ND	1	ND	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4
Guideline	50																					

ND = not detected — All results are reported as ng/g (ppb)

* Exceeds MOE guidelines for the open water disposal of dredged material (Persaud and Wilkins, 1976)

** PP = para para; OP = ortho para; DDE and DDD are metabolites of DDT

Chlor = Chlordane; DMDT = methoxychlor; Thio = Thiodan

Thio S = Thiodan sulphate; Thiodan 1, 2, and S = Endosulfan; Hept Epox = Heptachlor Epoxide

"Surface bed sediment" refers to the top 5 cm depth of sediment in the stream bed.

TABLE 17 (CONTINUED): PCB/ORGANOCHLORINE PESTICIDE CONCENTRATIONS** IN SURFACE BED SEDIMENTS OF THE DON RIVER: TAWMS SAMPLING PROGRAM, 1981.

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
Stn. TAWMS No. Code																						
85-003 (1) (abv G.M. Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-015 (2) (Germ. M. Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	ND	ND	ND	ND
85-017 (3) (Taylor Cr)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	ND	ND
85-016 (4) (Don V. Pkwy)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-001 (Mouth)	25	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4
Guideline	50																					

ND = not detected All results are reported as ng/g (ppb)

* Exceeds MOE guidelines for the open water disposal of dredged material (Persaud and Wilkins, 1976)

** PP = para para OP = ortho para DDE and DDD are metabolites of DDT

Chlor = Chlordane DMDT = methoxychlor Thio = Thiodan

Thio S = Thiodan sulphate Thiodan 1, 2, and S = Endosulfan Hept Epox = Heptachlor Epoxide

"Surface bed sediment" refers to the top 5 cm depth of sediment in the stream bed.

TABLE 18: PCB/ORGANOCHLORINE PESTICIDE RESIDUE CONCENTRATIONS* IN FRESHWATER CLAMS (ELLIPTIO COMPLANATUS) AFTER 21 DAYS EXPOSURE IN MIMICO CREEK: TAWMS SAMPLING PROGRAM, 1981

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
82-003 (12) (Mouth)	64±6	ND	ND	ND	ND	ND	ND	ND	ND	5 ± 2	7 ± 5	4 ± 3	ND	ND	ND	ND	ND	ND	ND	3 ± 3	ND	ND
Control (Balsam Lake)	ND	ND	ND	ND	3 ± 4	ND	ND	ND	ND	ND	ND	ND	ND	5±4	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4

All results are mean ± standard deviation in ng/g (ppb).

* PP = para para
Chlor = Chlordane
Thio S = Thiodan sulphate
ND = not detected

OP = ortho para
DMDT = methoxychlor
Thiodan 1, 2, and S = Endosulfan
"-" = no data

DDE and DDD are metabolites of DDT
Thio = Thiodan
Hept Epox = Heptachlor Epoxide

TABLE 18 (CONTINUED): PCB/ORGANOCHLORINE PESTICIDE RESIDUE CONCENTRATIONS* IN FRESHWATER CLAMS (ELLIPTIO COMPLANATUS) AFTER 21 DAYS EXPOSURE IN HUMBER RIVER: TAWMS SAMPLING PROGRAM, 1981

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
83-018 (6) (Bolton)	ND	ND	ND	ND	3 ± 3	ND	ND	ND	ND	ND	ND	3 ± 3	ND	ND	ND	ND	2 ± 2	ND	ND	ND	ND	ND
83-020 (7) (Hwy 27)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83-021 (8) (n of Hwy 7)	ND	ND	ND	ND	1 + 0	ND	1 ± 1	ND	ND	ND	2 ± 2	ND	ND	ND	ND	ND	ND	ND	ND	ND	3 ± 3	ND
83-022 (9) (Albion Rd)	37±13	ND	ND	ND	3 ± 5	ND	ND	ND	ND	2 ± 1	3 ± 2	ND	ND	ND	ND	ND	ND	ND	ND	ND	4 ± 1	ND
83-012 (10) (Black Cr)	56±30	ND	ND	ND	2 ± 2	ND	ND	ND	ND	29 ± 30	41 ± 29	2 ± 2	ND	ND	ND	ND	2 ± 1	ND	ND	1 ± 0	ND	ND
83-001 (Mouth)	63±14	ND	ND	ND	ND	ND	4 ± 2	ND	8 ± 1	1 ± 0	ND	1 ± 1	ND	ND	ND	ND	ND	ND	ND	1 ± 1	2 ± 1	ND
Control (Balsam Lake)	ND	ND	ND	ND	3 ± 4	ND	ND	ND	ND	ND	ND	ND	ND	5±4	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4

All results are mean ± standard deviation in ng/g (ppb).

* PP = para para
Chlor = Chlordane
Thio S = Thiodan sulphate
ND = not detected
OP = ortho para
DMDT = methoxychlor
Thiodan 1, 2, and S = Endosulfan
"-" = no data
DDE and DDD are metabolites of DDT
Thio = Thiodan
Hept Epox = Heptachlor Epoxide

TABLE 18 (CONTINUED): PCB/ORGANOCHLORINE PESTICIDE RESIDUE CONCENTRATIONS* IN FRESHWATER CLAMS (ELLIPTIO COMPLANATUS) AFTER 21 DAYS EXPOSURE IN THE DON RIVER: TAWMS SAMPLING PROGRAM, 1981

Contaminant	PCB	HCB	HEPTACHLOR	ALDRIN	PP DDE	MIREX	α BHC	β BHC	γ BHC	α CHLOR	γ CHLOR	OXY CHLOR	OP DDD	PP DDD	PP DDT	DMDT	THIO 1	THIO 2	THIO S	HEPT EPOX	DIELDRIN	ENDRIN
85-003 (1) (abv G.M. Cr)	23±2	1±1	ND	ND	2±1	ND	25±13	ND	9±2	14±4	8±2	ND	ND	ND	ND	ND	1±1	ND	ND	3±1	2±1	ND
85-015 (2) (Germ.M. Cr)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85-017 (3) (Taylor Cr)	18±7	ND	ND	ND	ND	ND	ND	ND	ND	5±3	6±5	3±3	ND	ND	ND	ND	ND	ND	ND	ND	3±2	ND
85-016 (4) (Don V. Pkwy)	26±6	ND	ND	ND	1±0	ND	ND	ND	ND	3±1	2±2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
85-001 (Mouth)	ND	1±1	ND	ND	1±1	ND	ND	ND	3±3	2±1	1±1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Control (Balsam Lake)	ND	ND	ND	ND	3±4	ND	ND	ND	ND	ND	ND	ND	ND	5±4	ND	ND	ND	ND	ND	ND	ND	ND
Detection Limit	20	1	1	1	1	5	1	1	1	2	2	2	5	5	5	4	2	4	4	1	2	4

All results are mean ± standard deviation in ng/g (ppb).

* PP = para para
OP = ortho para
DDE and DDD are metabolites of DDT
Chlor = Chlordane
DMDT = methoxychlor
Thio = Thiodan
Thio S = Thiodan sulphate
Thiodan 1, 2, and S = Endosulfan
Hept Epox = Heptachlor Epoxide
ND = not detected
"-" = no data

TABLE 19: PCB/ORGANOCHLORINE RESIDUES IN YOUNG-OF-THE-YEAR FISH SPECIES COLLECTED FROM THE DON RIVER, HUMBER RIVER, AND MIMICO CREEK, 1981

Location (Stn. No.)	Species	*No. of Samples	**Fish Length (mm)	% Lipids	PCB ng/g	Σ DDT ng/g	Σ BHC ng/g	Σ Chlordane ng/g
Don River								
Don Above Taylor Creek (F10)	Longnose Dace	5	40 ± 3	3.4 ± 0.4	208 ± 39	85 ± 17	26 ± 33	58 ± 10
Taylor Creek (F9)	Longnose Dace	5	44 ± 3	6.2 ± 0.6	523 ± 42	141 ± 28	679 ± 60	65 ± 8
Don/W. Don Confluence (F8)	Longnose Dace	5	47 ± 3	5.5 ± 0.4	501 ± 48	122 ± 36	17 ± 8	48 ± 3
Don at Pottery Road (F7)	Longnose Dace	5	46 ± 4	7.4 ± 0.9	372 ± 149	86 ± 33	36 ± 22	57 ± 21
Don Below Bloor Street (F6)	Longnose Dace	5	46 ± 3	7.0 ± 0.7	440 ± 64	69 ± 20	56 ± 17	68 ± 5
Humber River								
Finch Avenue (F5)	Common Shiners	3	57 ± 6	3.8 ± 0.5	160 ± 37	20 ± 3	6 ± 2	11 ± 7
Scarlett Road (F4)	Common Shiners	4	59 ± 3	5.7 ± 0.3	2282 ± 184	15 ± 12	6 ± 2	9 ± 2
Black Creek (F3)	Common Shiners	4	55 ± 3	6.1 ± 0.2	1106 ± 195	30 ± 25	9 ± 2	12 ± 2
River Valley Cres.(F2)	Common Shiners	5	56 ± 3	3.4 ± 0.3	1054 ± 101	65 ± 21	17 ± 8	14 ± 1
Humber River Mouth (F1)	Spottail Shiners	6	62 ± 5	5.0 ± 0.8	954 ± 45	85 ± 41	10 ± 2	26 ± 9
Mimico Creek								
Mimico Creek Mouth (F11)	Spottail Shiners	5	68 ± 4	6.4 ± 0.2	1051 ± 105	137 ± 18	19 ± 2	47 ± 3

* Composites of 10 fish each
** Total Length
Mean of samples shown ± 1 standard deviation in ng/g (ppb).
Note that several species of fish are represented in these data. Caution must be used in comparing data from one species to another until differences (if any) in the bioaccumulation mechanisms of the species are better understood.

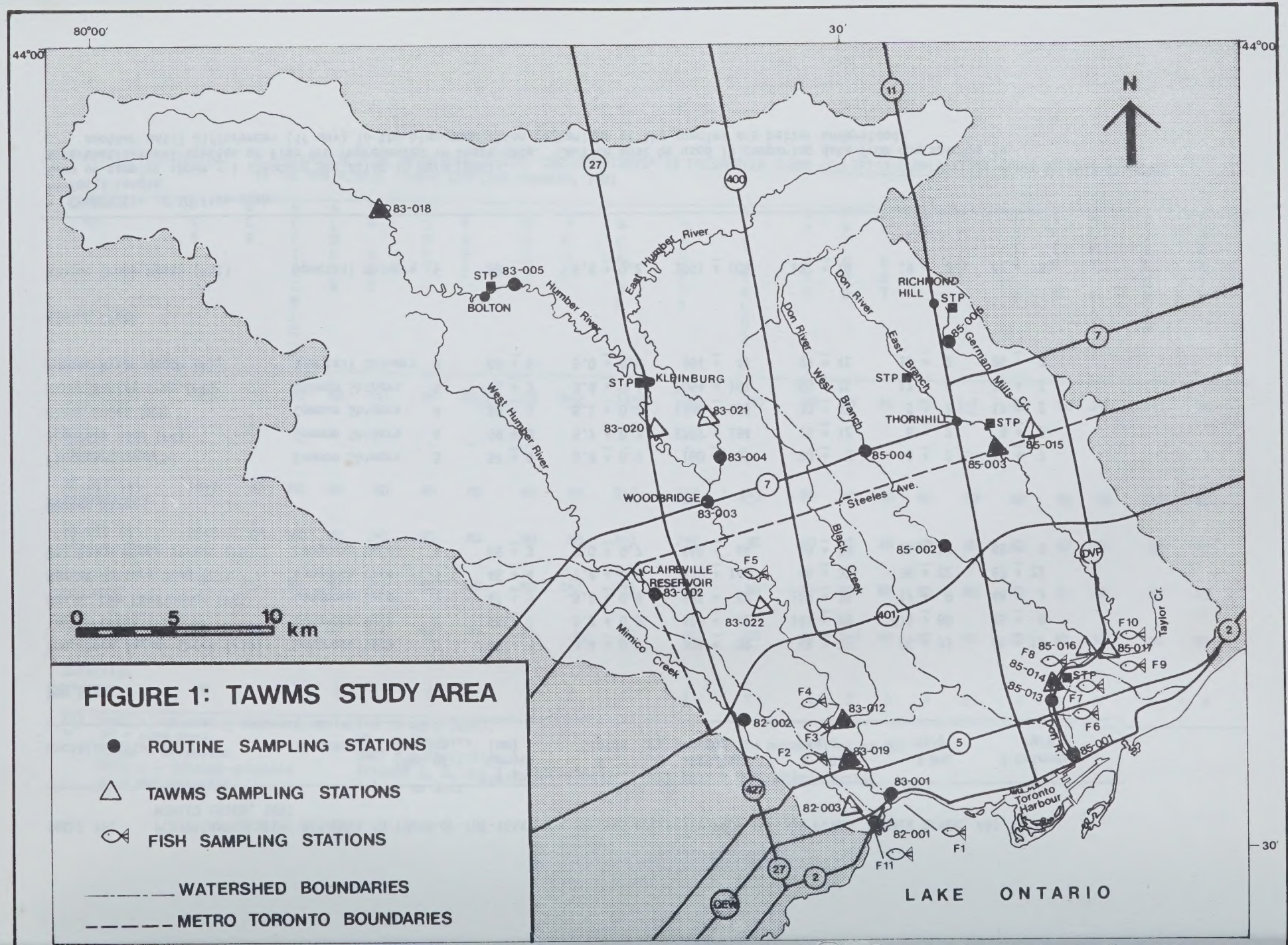
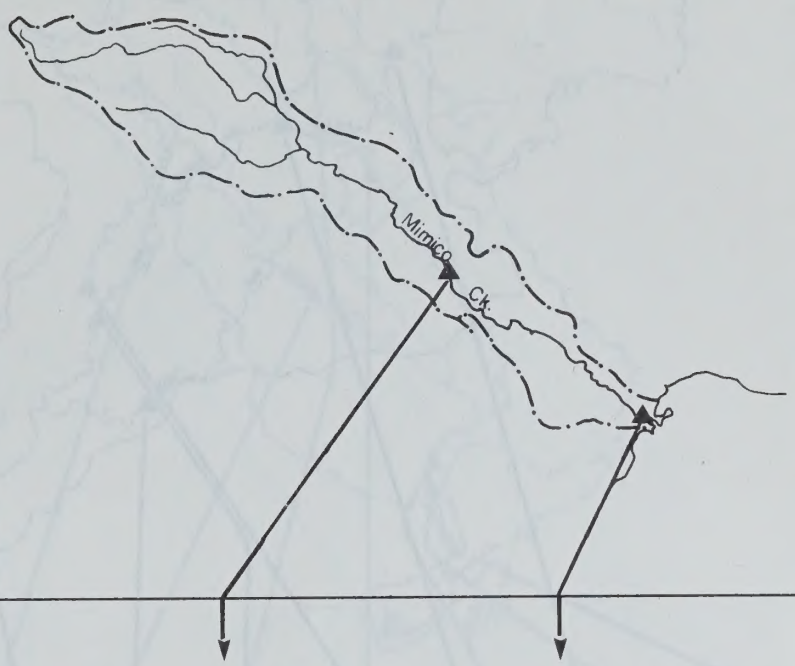
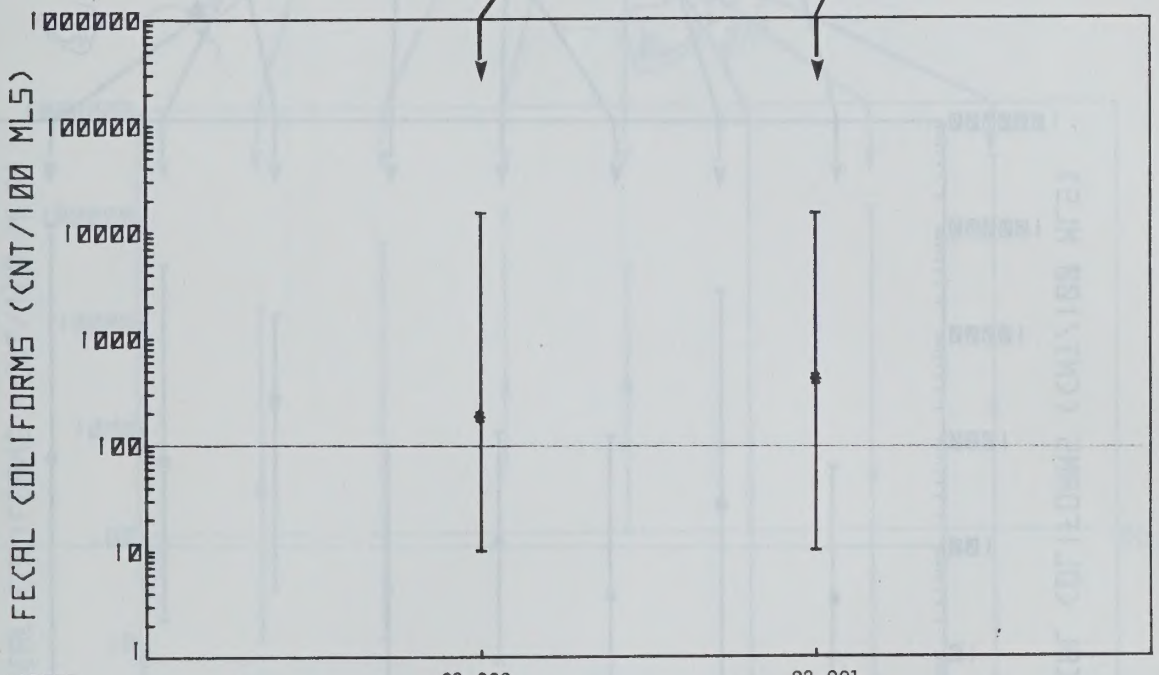


FIGURE 1: TAWMS STUDY AREA

- ● ROUTINE SAMPLING STATIONS
- △ TAWMS SAMPLING STATIONS
- FISH SAMPLING STATIONS
- _____ WATERSHED BOUNDARIES
- _ _ _ _ _ METRO TORONTO BOUNDARIES

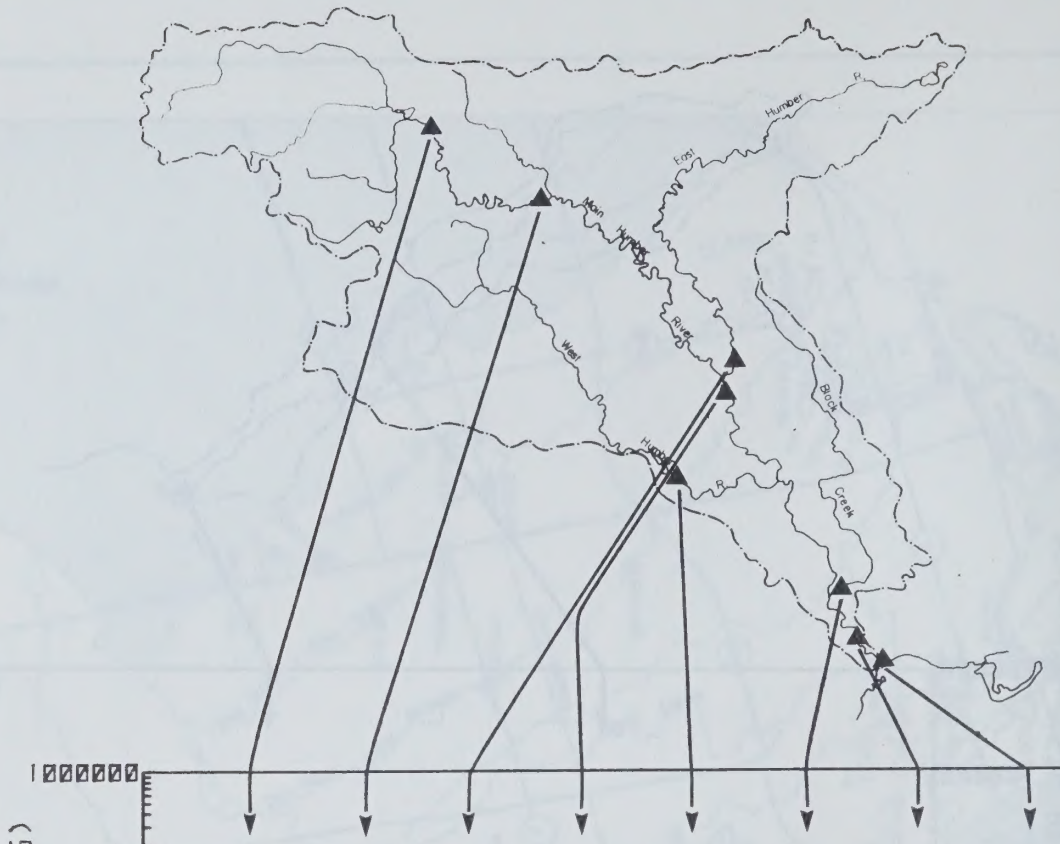


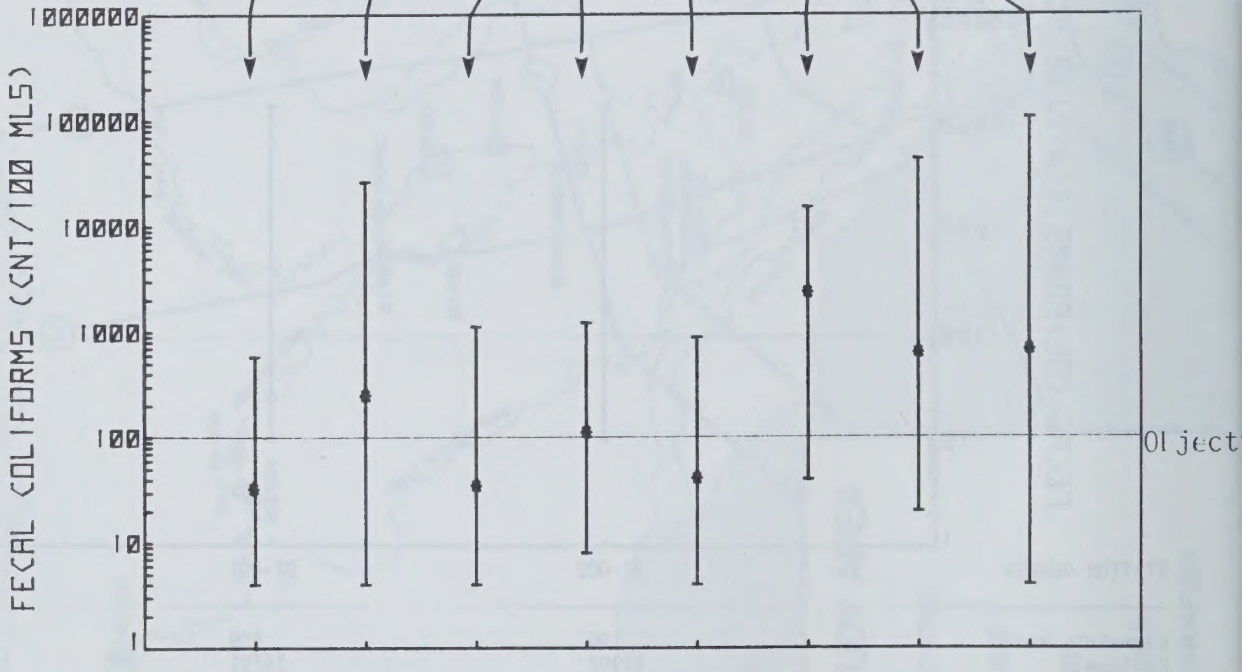


STATION NUMBER	82-002	82-001
Geometric Mean	196	409
Maximum	14997	14791
Minimum	10	10
N	27	27
% Exceeding Objective	56	78

Note: * = geometric mean shown with maximum-minimum range

FIGURE 2. Fecal Coliforms (cnt/100 mls) in Mimico Creek, 1978-80.

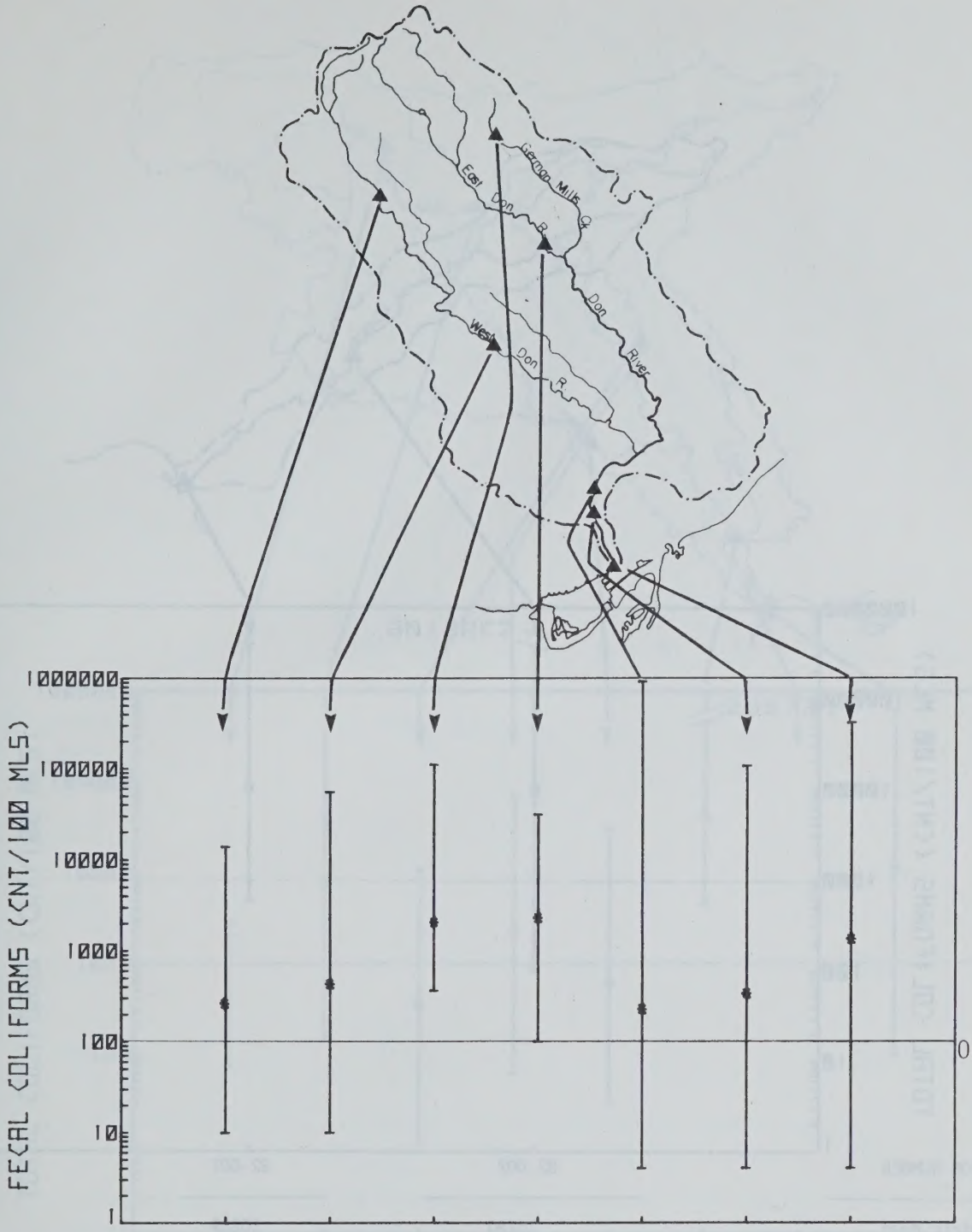




STATION NUMBER	83-018	83-005	83-004	83-003	83-002	83-012	83-019	83-001
Geometric Mean	35	250	35	111	41	2339	630	678
Maximum	579	26000	1100	1200	879	14997	42954	105925
Minimum	4	4	4	8	4	40	20	4
N	31	26	28	27	28	29	64	72
% Exceeding Objective	19	58	25	52	32	86	86	93

Note: * = geometric mean shown with maximum-minimum range

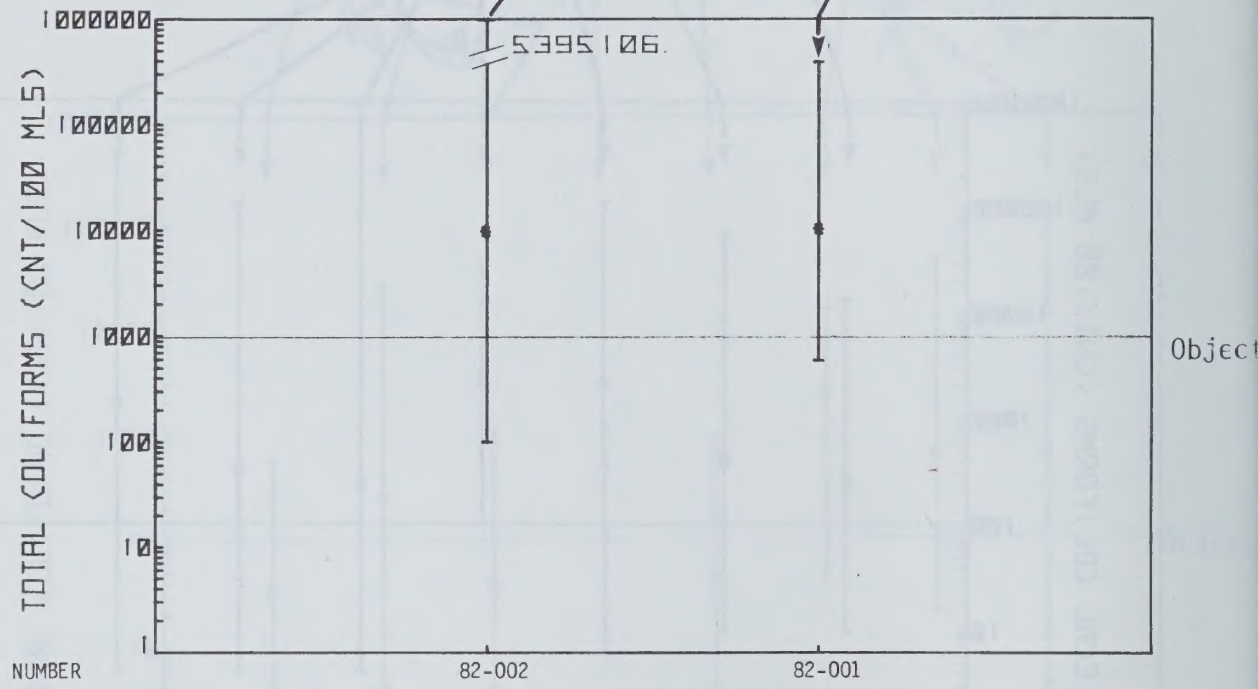
FIGURE 3. Fecal Coliforms (cnt/100 mls) in the Humber River, 1978-80.



STATION NUMBER	85-004	85-002	85-005	85-003	85-014	85-013	85-001
Geometric Mean	279	427	2051	2280	279	333	1321
Maximum	13900	54954	109900	30974	13900	105925	319890
Minimum	10	10	360	100	10	4	4
N	26	26	28	29	26	47	54
% Exceeding Objective	69	73	100	97	69	55	83

Note: *= geometric mean shown with maximum-minimum range

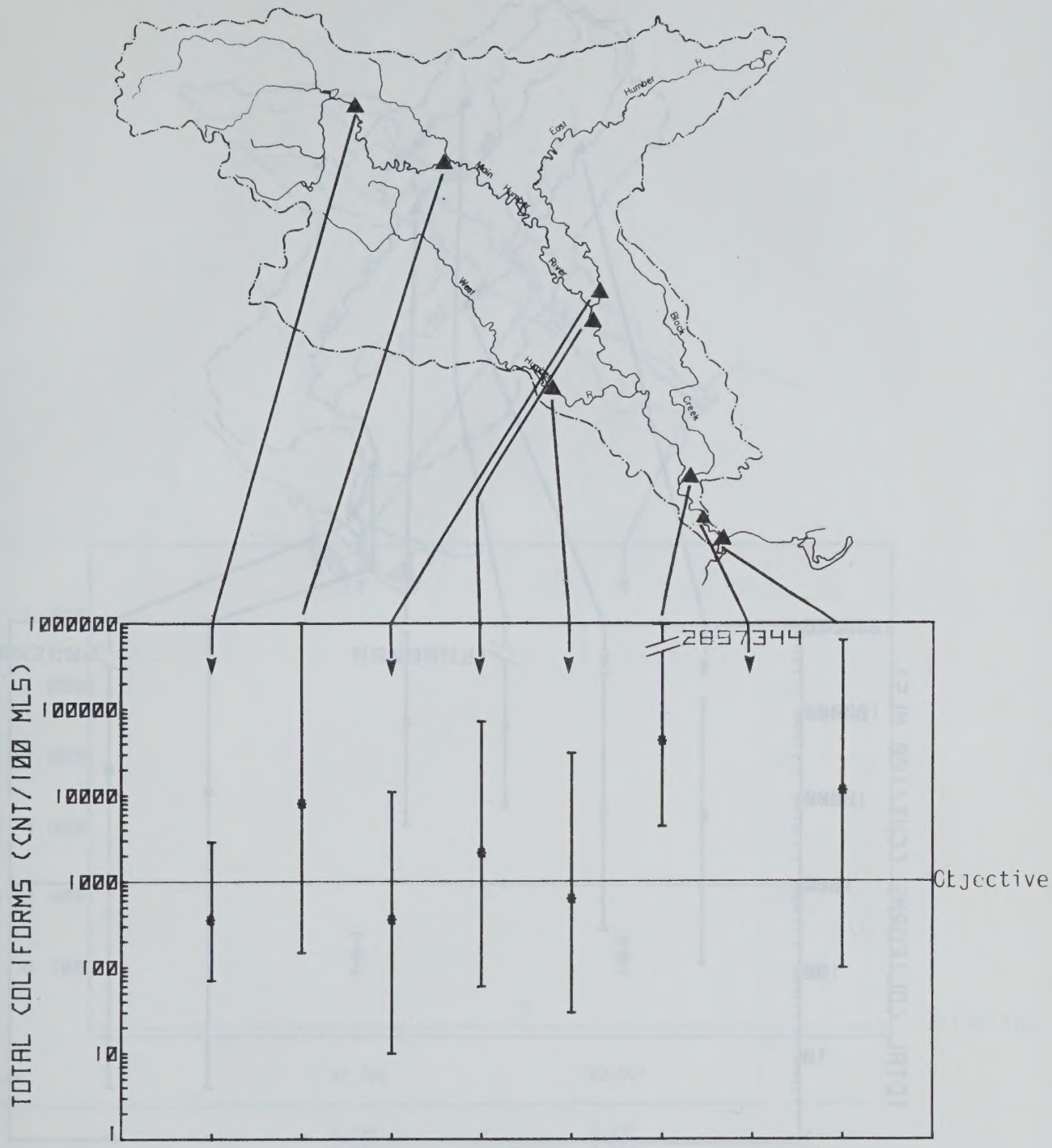
FIGURE 4. Fecal Coliforms (cnt/100 mls) in the Don River, 1978-80.



STATION NUMBER	82-002	82-001
Geometric Mean	10280	10209
Maximum	5395106	389942
Minimum	100	590
N	27	27
% Exceeding Objective	90	82

Note: * = geometric mean shown with maximum-minmum rang

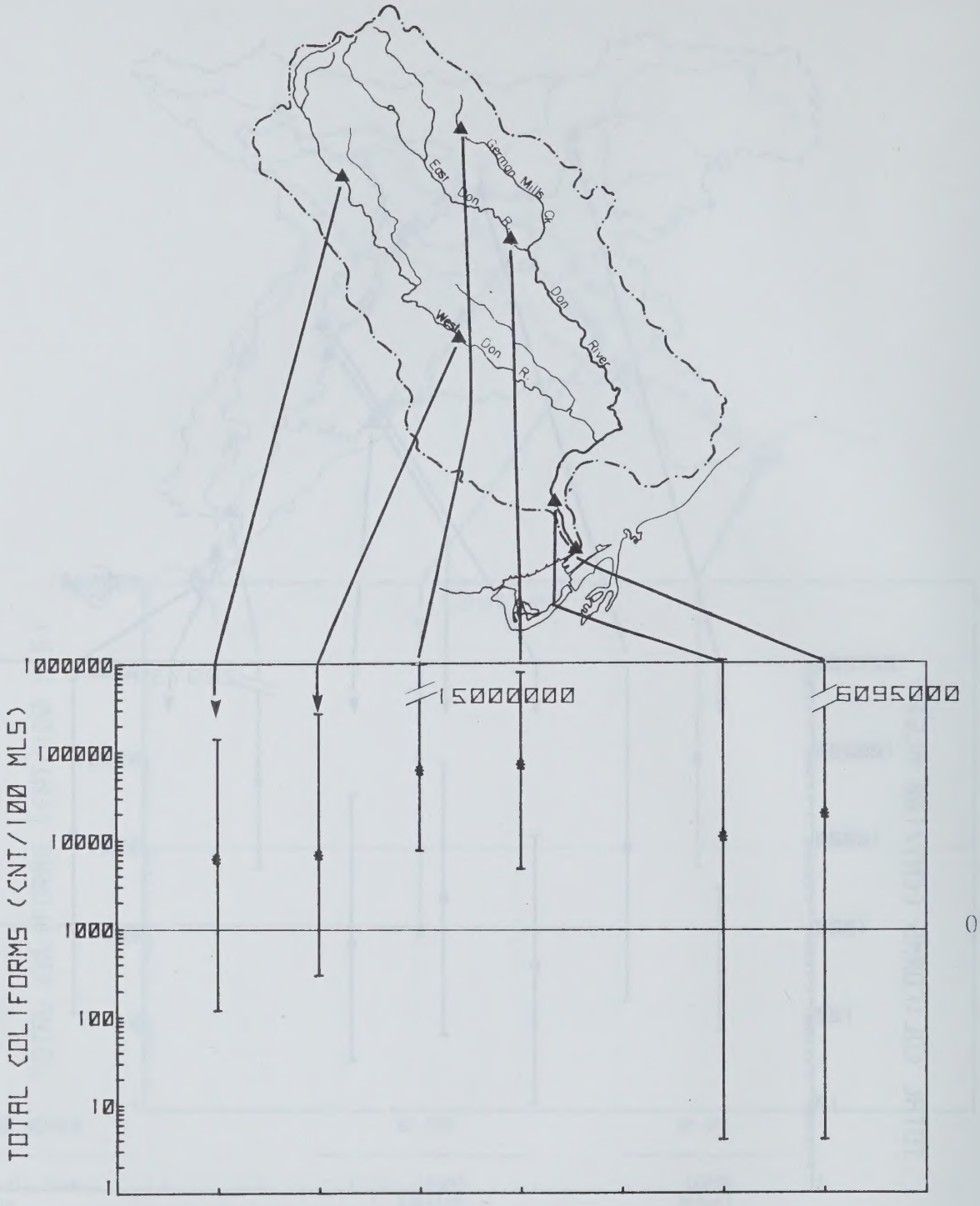
FIGURE 5. Total Coliforms (cnt/100 mls) in Mimico Creek, 1978-80.



STATION NUMBER	83-018	83-005	83-004	83-003	83-002	83-012	83-019	83-001
Geometric Mean	382	8110	360	2153	632	43053	-	11508
Maximum	2897	1009253	10990	71945	30974	2897344	-	629506
Minimum	70	148	10	60	30	4395	-	100
N	30	26	28	27	28	29	-	22
% Exceeding Objective	17	89	21	59	36	100	-	91

Note: * = geometric mean shown with maximum-minimum range

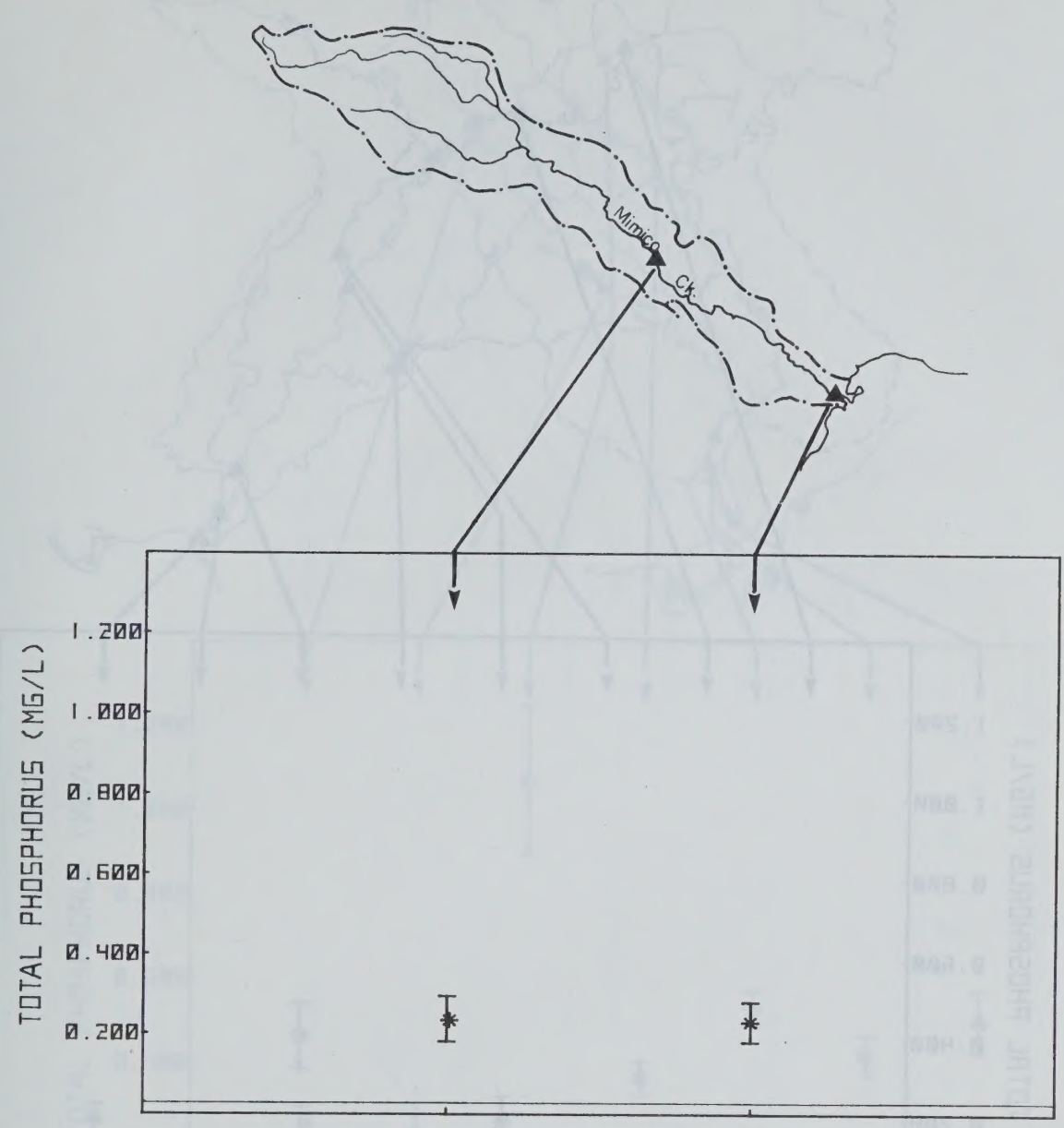
FIGURE 6. Total Coliforms (cnt/100 mls) in the Humber River, 1978-80.



STATION NUMBER	85-004	85-002	85-005	85-003	85-014	85-013	85-001
Geometric Mean	6577	6776	61094	70958	-	10740	19409
Maximum	140900	269800	15000000	790700	-	1079000	6095000
Minimum	120	300	7603	4699	-	4	4
N	26	26	28	29	-	28	24
% Exceeding Objective	85	81	100	100	-	82	83

Note: * = geometric mean shown with maximum-minimum range

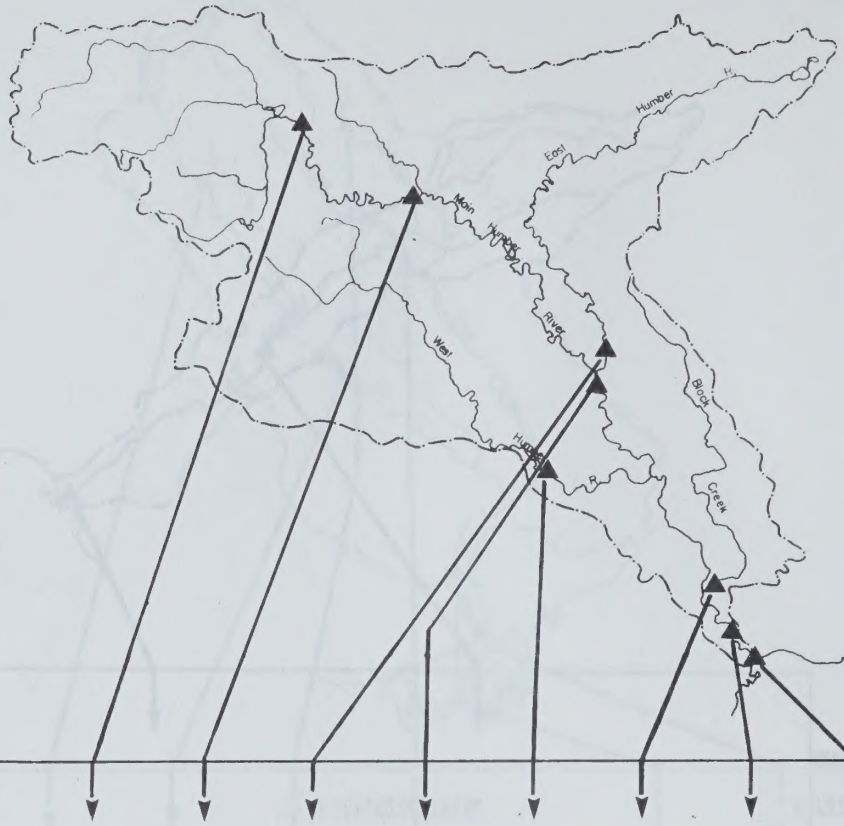
FIGURE 7. Total Coliforms (cnt/100 mls) in the Don River, 1978-80.

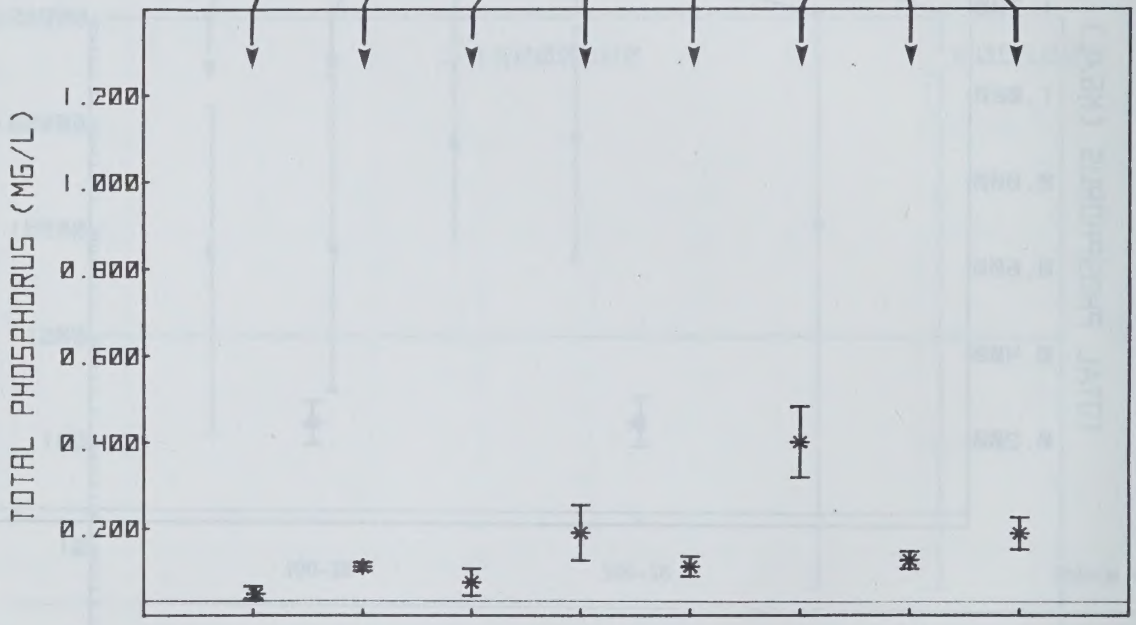


STATION NUMBER	82-002	82-001
Mean	0.238	0.231
Maximum	1.320	1.150
Minimum	0.022	0.029
Std. Deviation	0.284	0.260
N	25	27
% Exceeding Objective	96	96

Note: * = mean shown with standard error

FIGURE 8. Total Phosphorus (mg/L) in Mimico Creek, 1978-80.

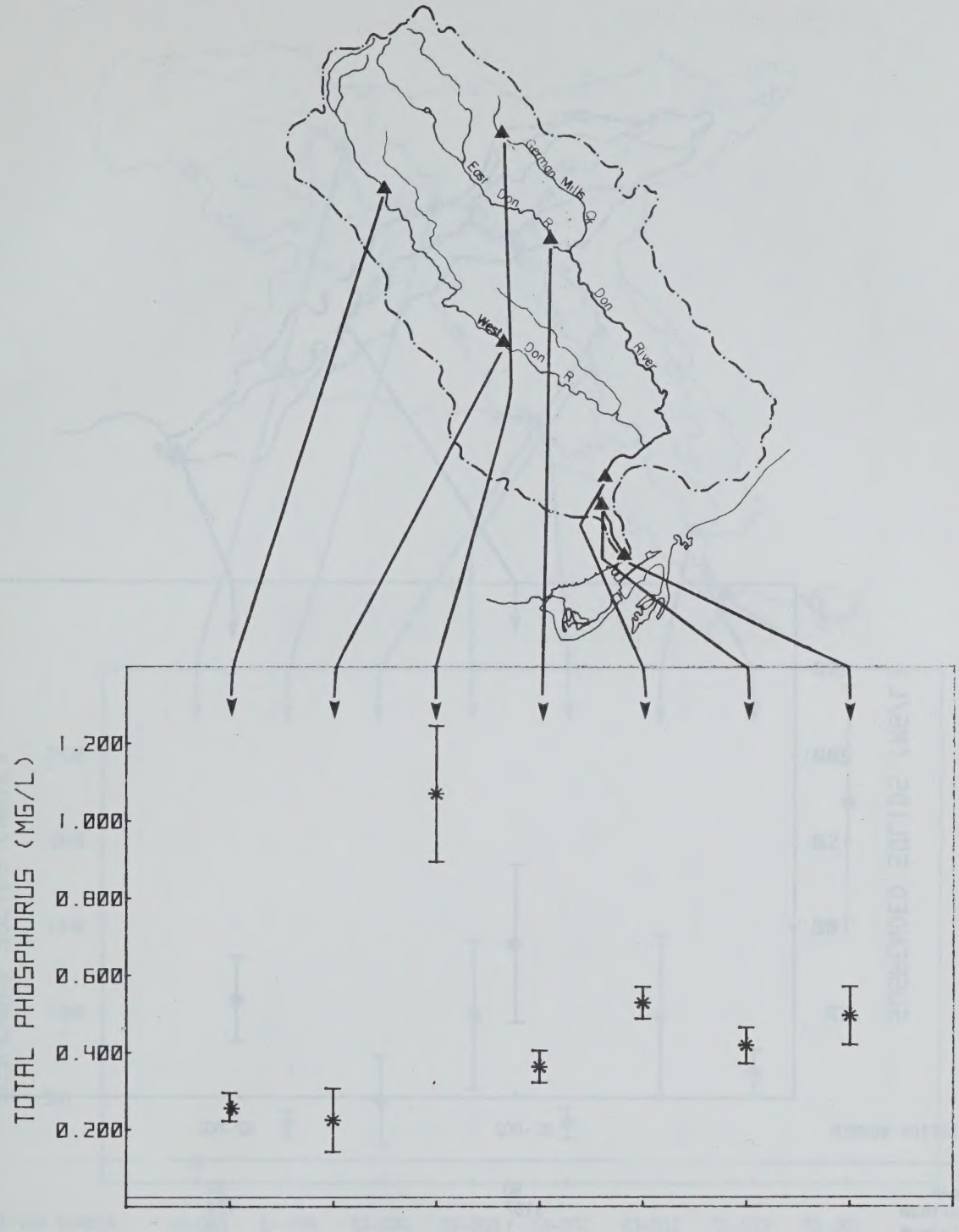




STATION NUMBER	83-018	83-005	83-004	83-003	83-002	83-012	83-019	83-001
Mean	0.053	0.113	0.077	0.191	0.113	0.401	0.127	0.189
Maximum	0.380	0.195	0.780	1.250	0.505	1.960	1.080	1.940
Minimum	0.011	0.035	0.006	0.030	0.022	0.108	0.020	0.025
Std. Deviation	0.081	0.050	0.162	0.333	0.121	0.440	0.166	0.330
N	31	25	27	27	28	29	68	79
% Exceeding Objective	48	100	36	96	96	100	78	99

* = mean shown with standard error

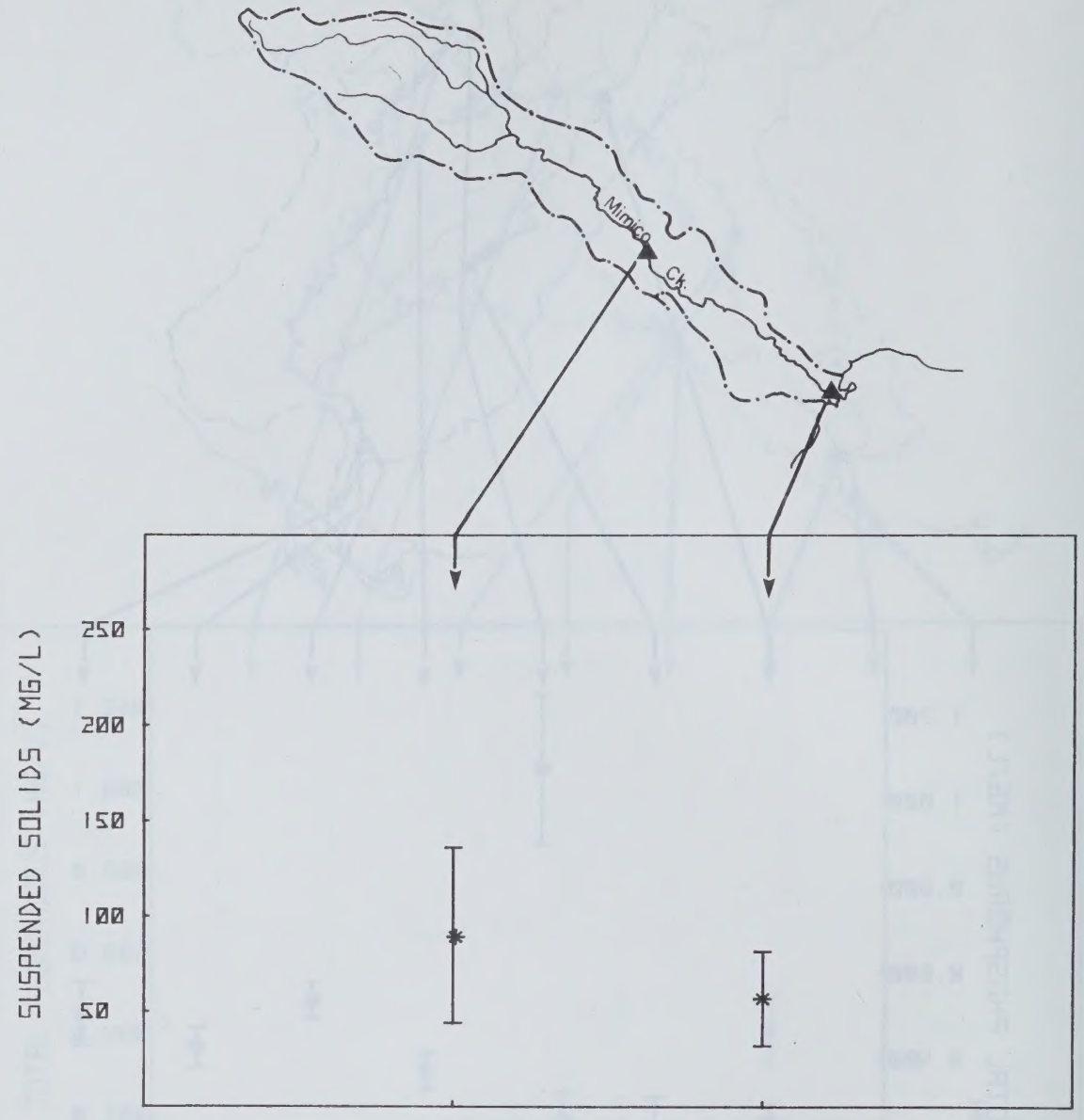
FIGURE 9. Total Phosphorus (mg/L) in the Humber River, 1978-80.



STATION NUMBER	85-004	85-002	85-005	85-003	85-014	85-013	85-001
Mean	0.259	0.225	1.069	0.364	0.528	0.418	0.495
Maximum	0.760	2.380	5.080	0.930	1.940	1.940	3.830
Minimum	0.055	0.051	0.380	0.074	0.137	0.032	0.077
Std. Deviation	0.188	0.437	0.928	0.222	0.329	0.319	0.596
N	26	28	29	28	64	48	63
% Exceeding Objective	100	100	100	100	100	100	100

Note: * = mean shown with standard error

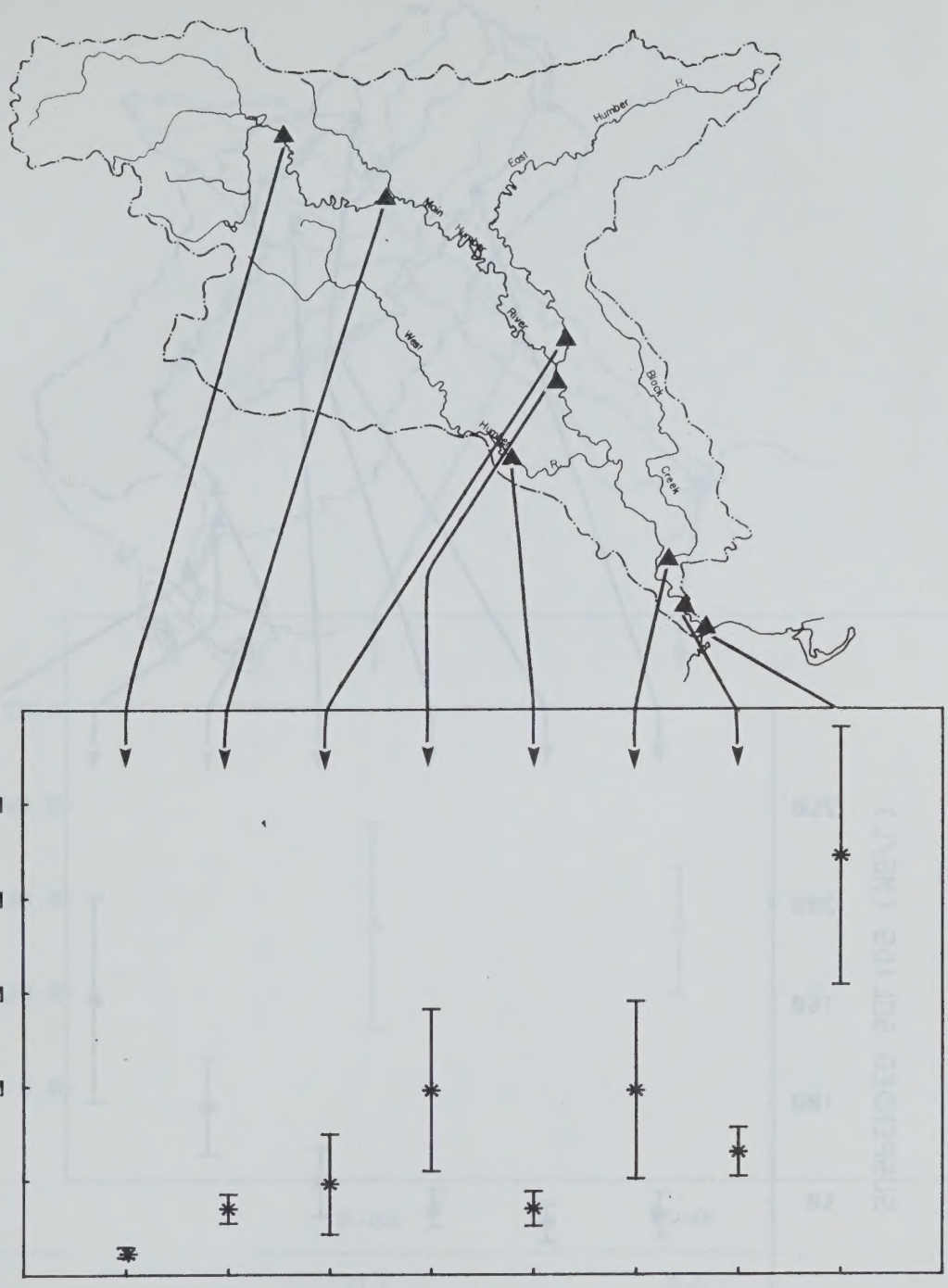
FIGURE 10. Total Phosphorus (mg/L) in the Don River, 1978-80.



STATION NUMBER	82-002	82-001
Mean	90	57
Maximum	1167	724
Minimum	1	3
Std. Deviation	234	129
N	26	27

Note: * = mean shown with standard error

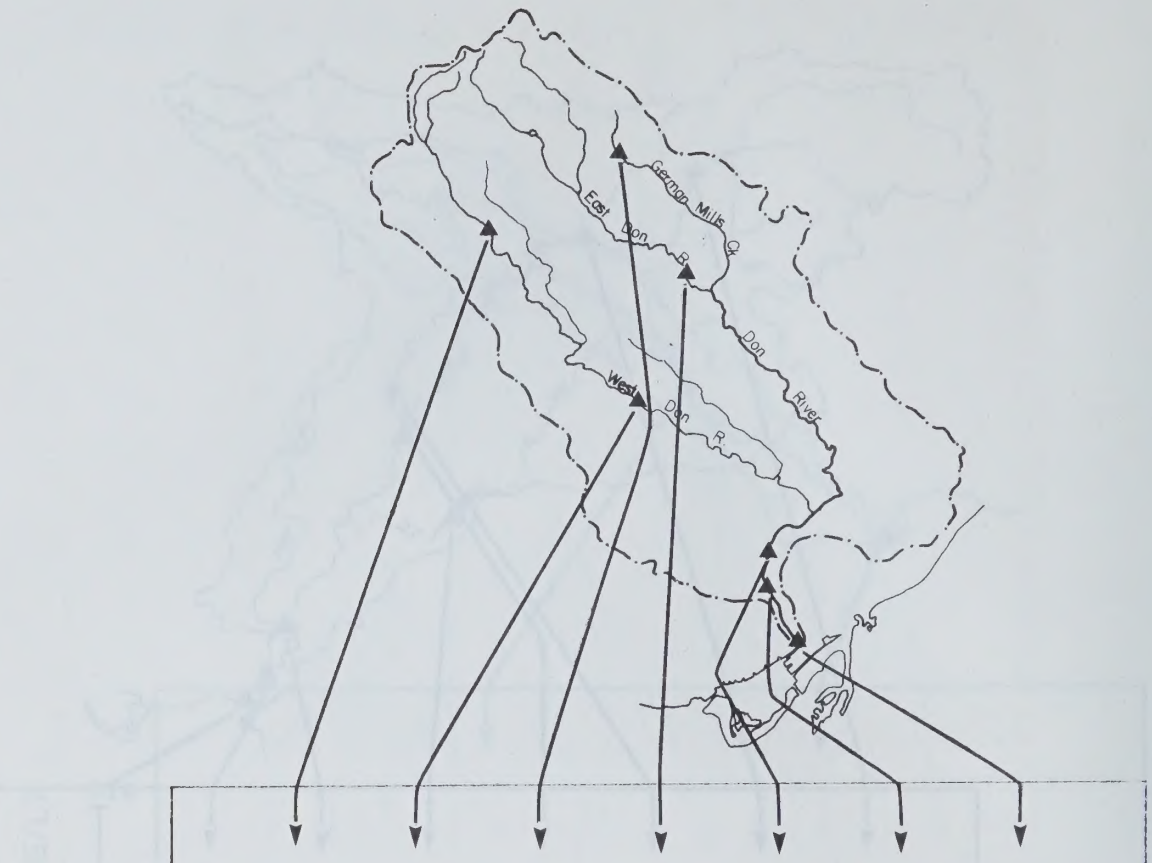
FIGURE 11. Suspended Solids (mg/L) in Mimico Creek, 1978-80.



STATION NUMBER	83-018	83-005	83-004	83-003	83-002	83-012	83-019	83-001
Mean	12	35	48	98	35	98	65	222
Maximum	65	131	543	1177	179	1312	534	3972
Minimum	1	3	2	6	3	1	3	3
Std. Deviation	15	39	122	224	42	254	106	606
N	31	26	21	27	21	29	66	79

Note: * = mean shown with standard error

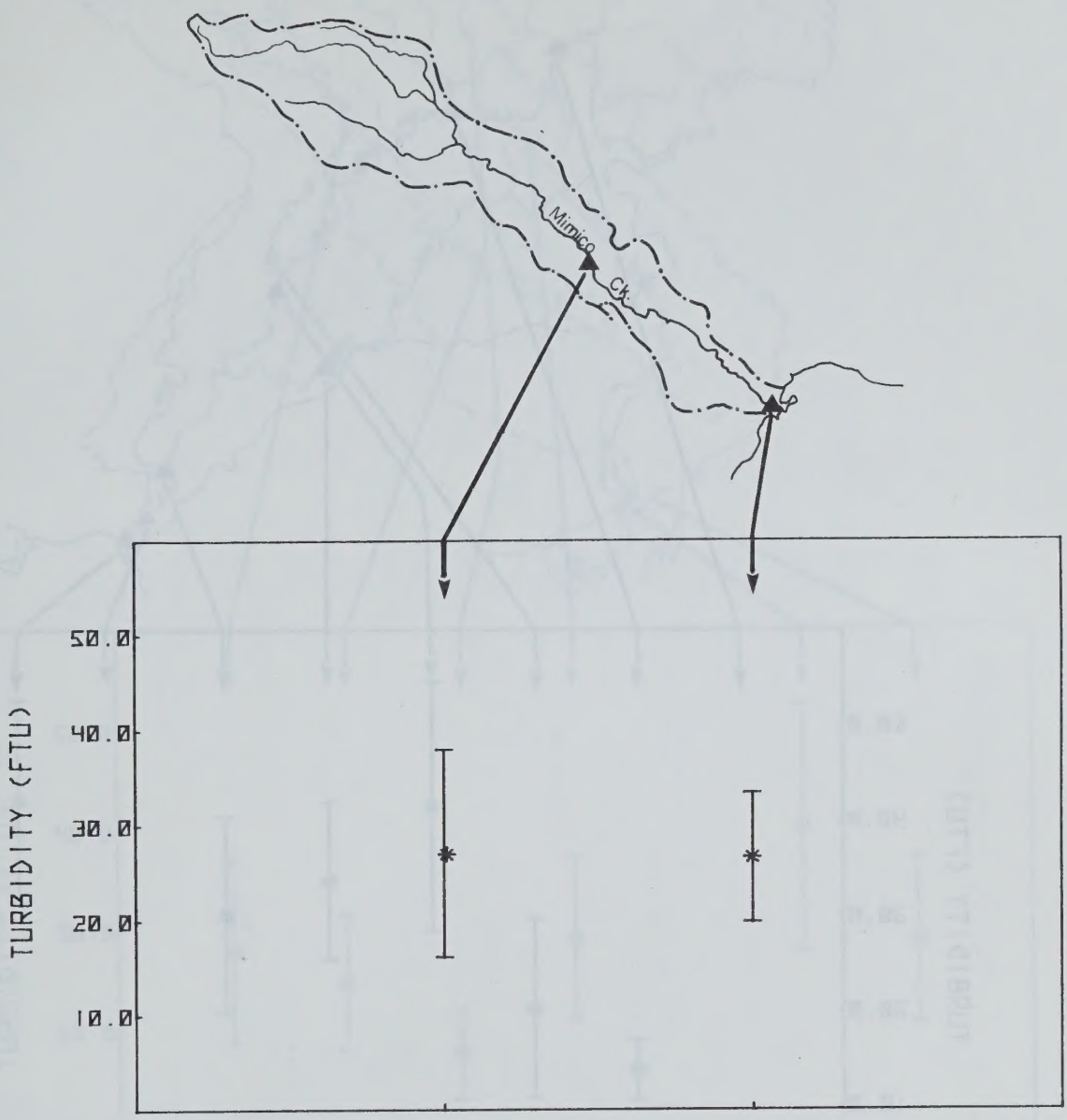
FIGURE 12. Suspended Solids (mg/L) in the Humber River, 1978-80.



STATION NUMBER	85-004	85-002	85-005	85-003	85-014	85-013	85-001
Mean	44	39	46	59	97	151	94
Maximum	186	207	264	486	1103	1933	2416
Minimum	3	3	7	5	6	2	4
Std. Deviation	57	52	52	96	201	353	326
N	26	28	29	29	66	46	63

Note: * = mean shown with standard error

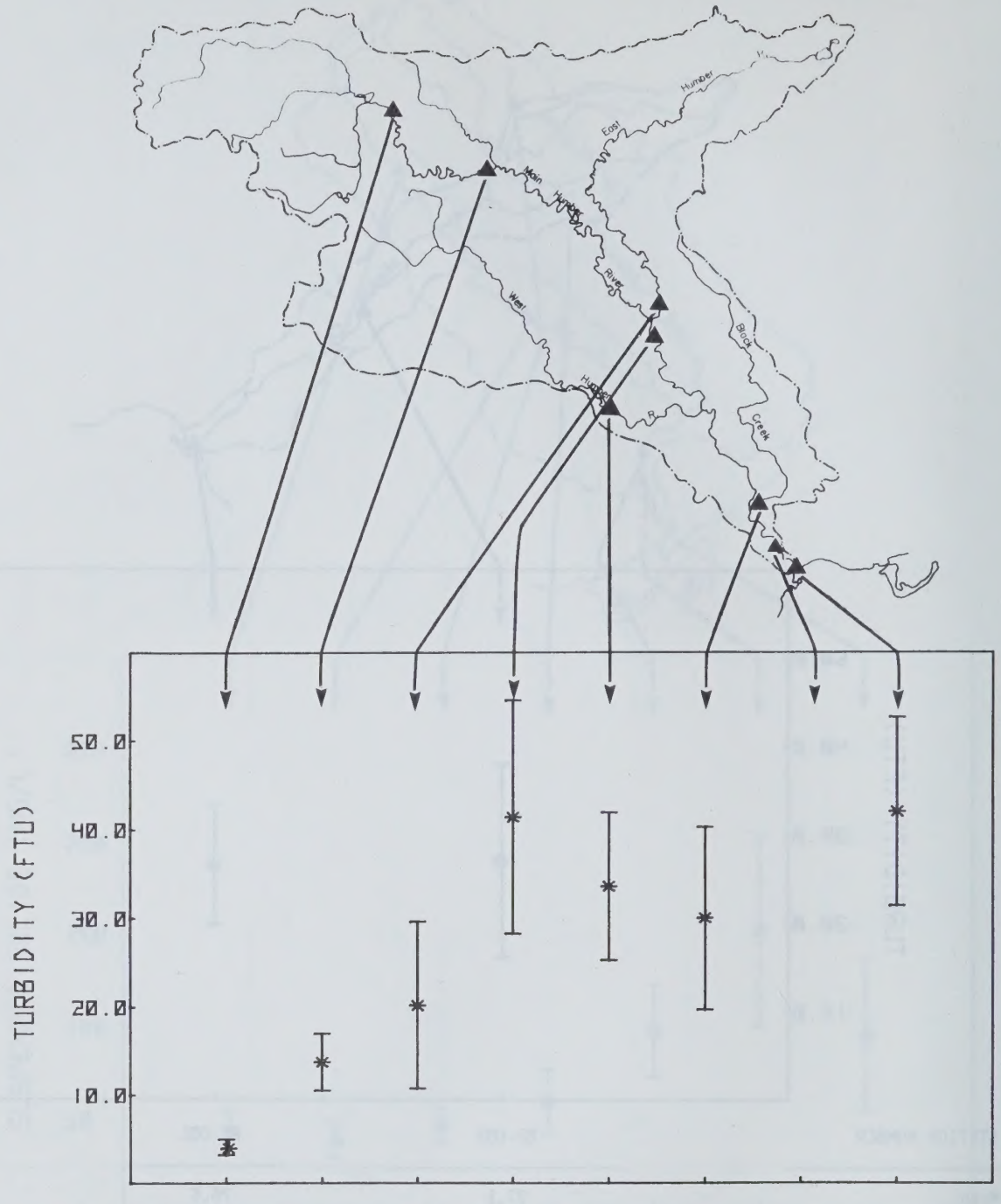
FIGURE 13. Suspended Solids (mg/L) in the Don River, 1978-80.



STATION NUMBER	82-002	82-001
Mean	27.1	26.6
Maximum	165.0	130.0
Minimum	2.2	1.6
Std. Deviation	47.6	35.3
N	19	27

Note: * = mean shown with standard error

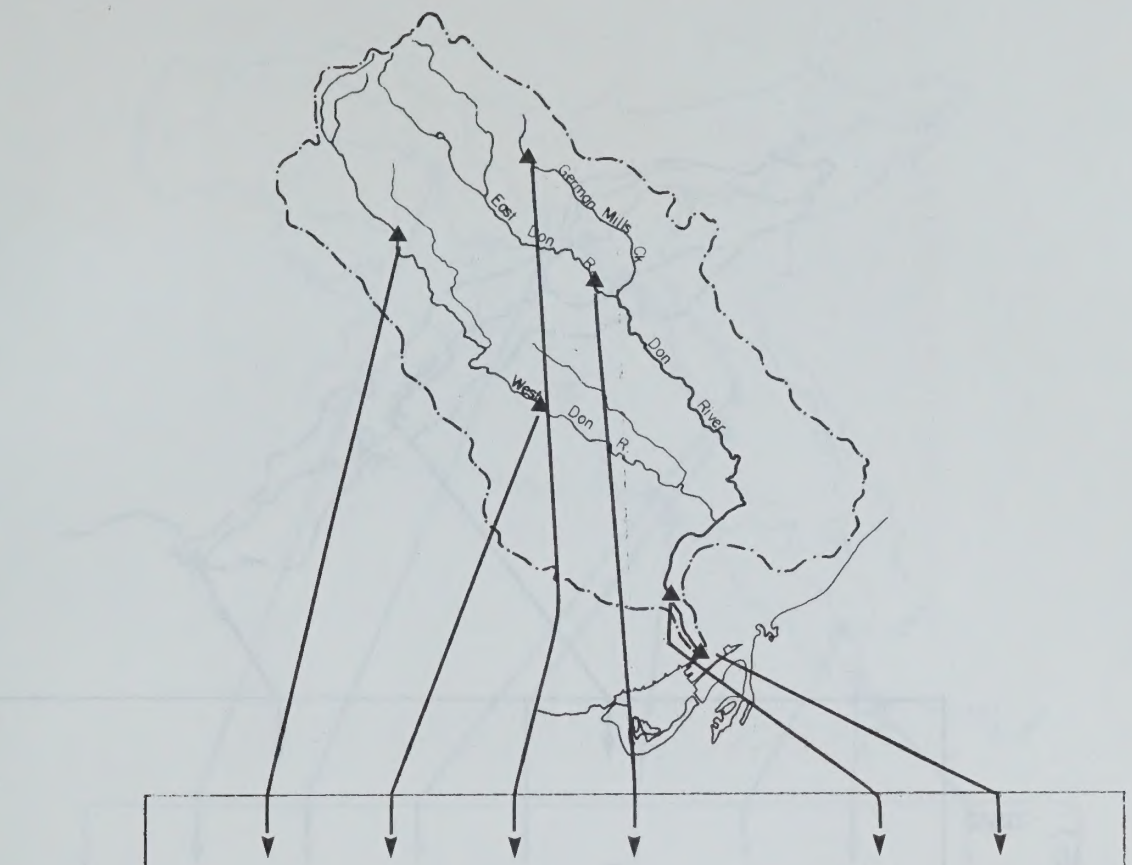
FIGURE 14. Turbidity (FTU) in Mimico Creek, 1978-80.



STATION NUMBER	83-018	83-005	83-004	83-003	83-002	83-012	83-019	83-001
Mean	4.1	13.8	20.2	41.4	33.6	30.0	-	42.0
Maximum	27.0	53.0	190.0	270.0	160.0	230.0	-	180.0
Minimum	0.7	2.7	2.3	5.5	6.2	3.7	-	5.3
Std. Deviation	4.9	14.2	43.3	58.7	38.1	48.2	-	49.7
N	31	19	21	20	21	22	-	22

Note: * = mean shown with standard error

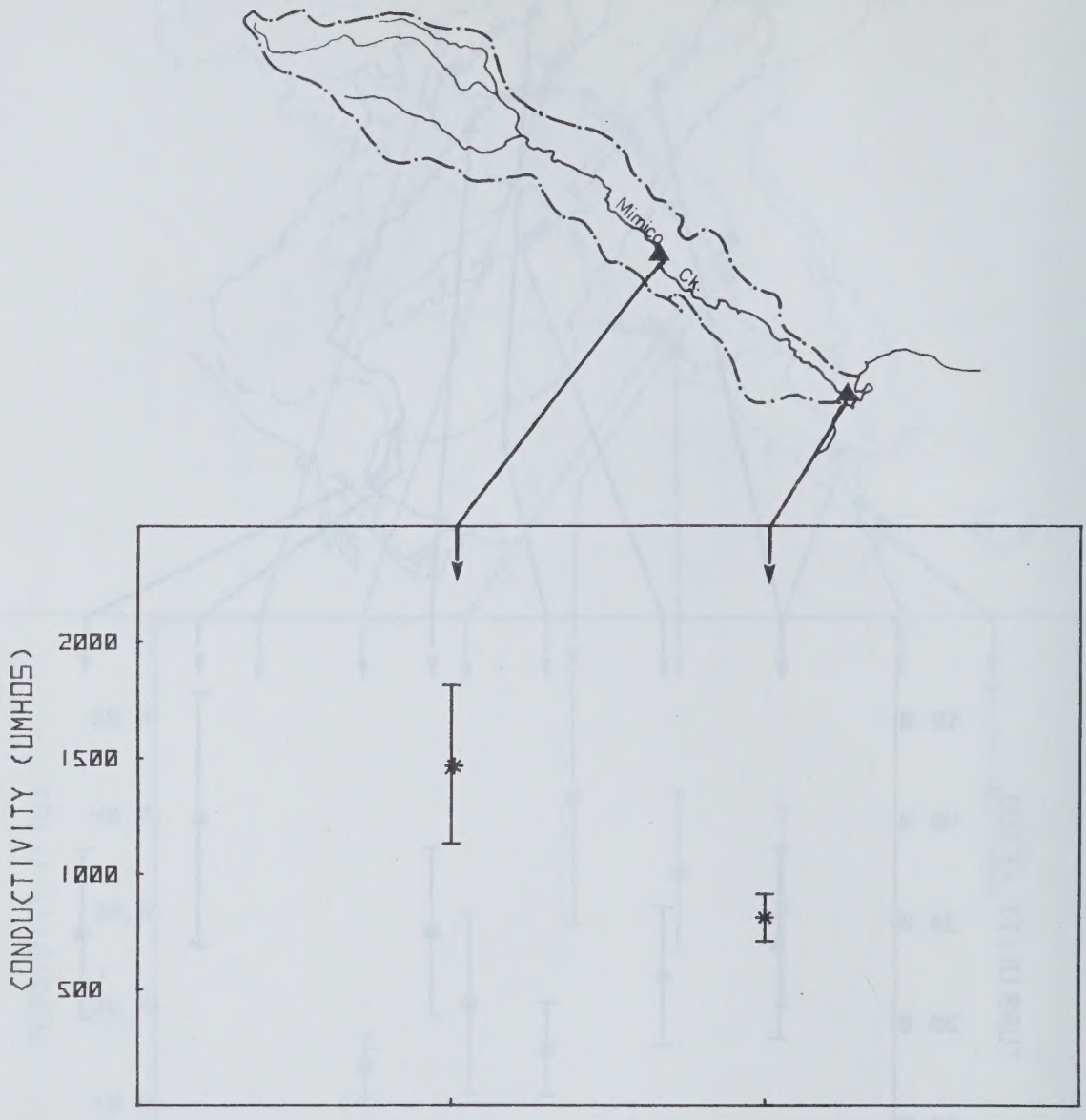
FIGURE 15. Turbidity (FTU) in the Humber River, 1978-80.



STATION NUMBER	85-004	85-002	85-005	85-003	85-014	85-013	85-001
Mean	27.9	24.6	17.4	28.9	-	39.8	28.5
Maximum	140.0	170.0	100.0	180.0	-	250.0	160.0
Minimum	1.6	2.8	4.2	4.4	-	3.7	2.8
Std. Deviation	40.9	35.9	21.8	39.4	-	58.4	38.9
N	19	28	22	22	-	22	22

Note : * = mean shown with standard error

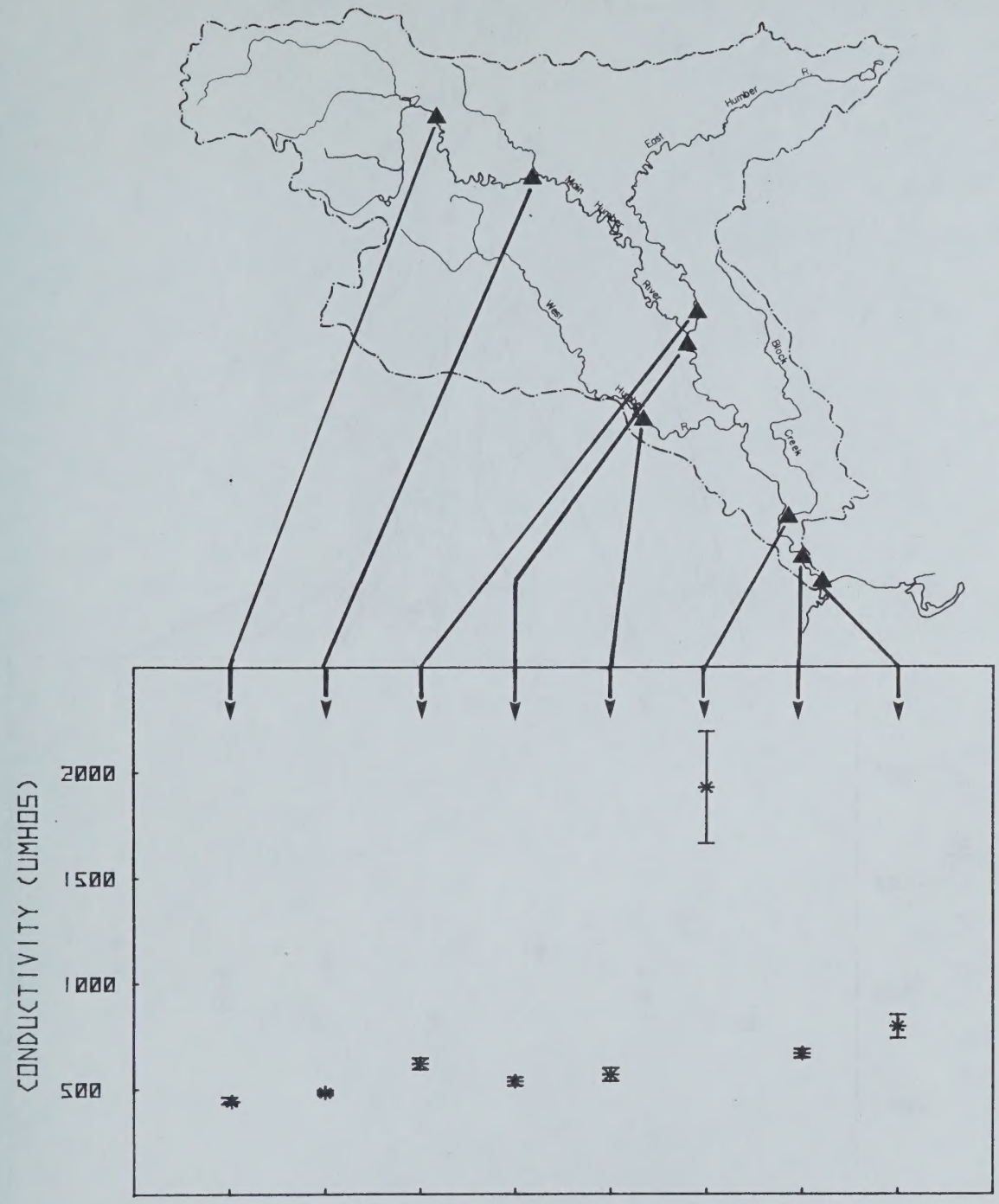
FIGURE 16. Turbidity (FTU) in the Don River, 1978-80.



STATION NUMBER	82-002	82-001
Mean	1472	812
Maximum	8100	2850
Minimum	240	360
Std. Deviation	1731	533
N	26	27

Note: * = mean shown with standard error

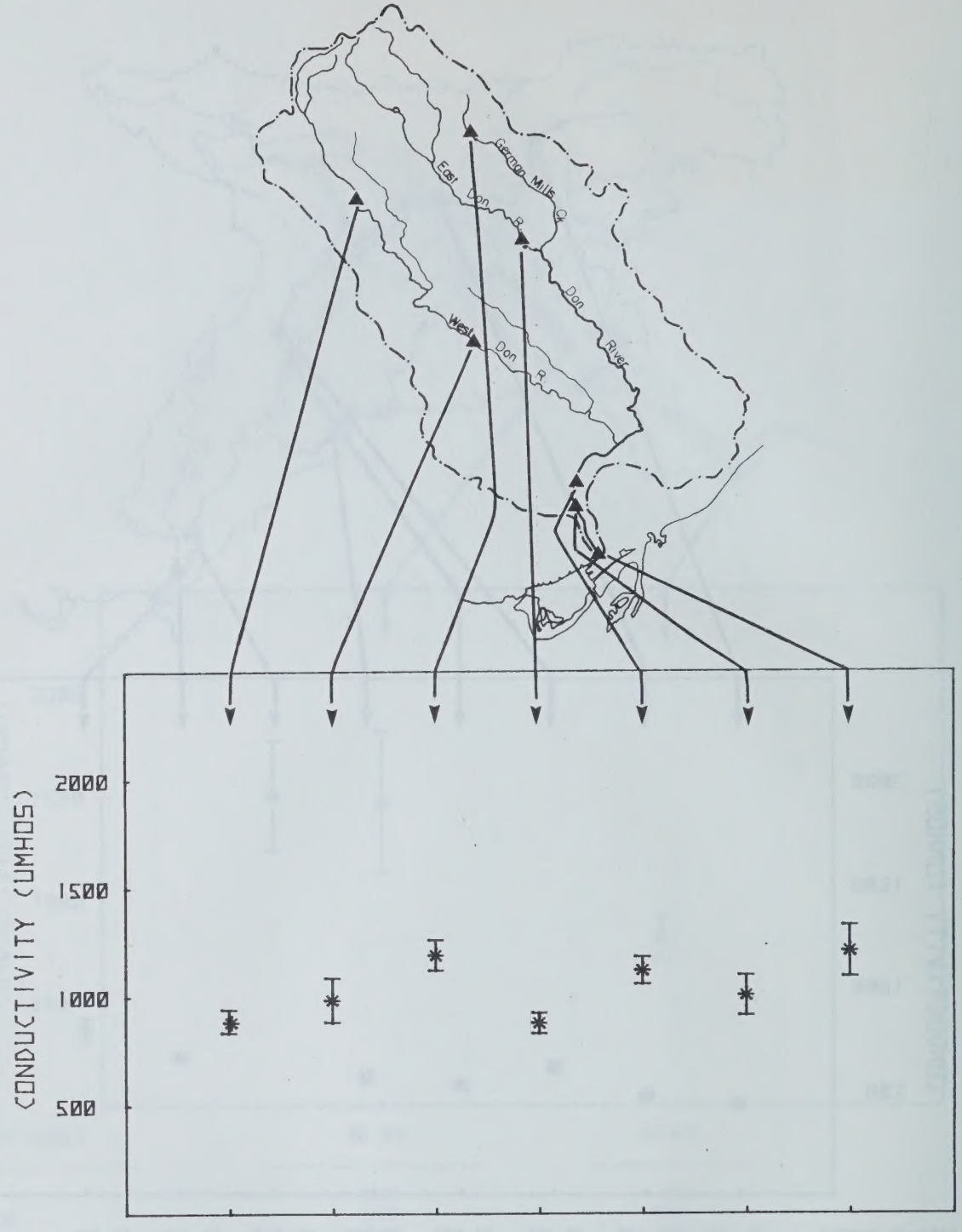
FIGURE 17. Conductivity (umhos/cm^2) in Mimico Creek, 1978-80.



STATION NUMBER	83-018	83-005	83-004	83-003	83-002	83-012	83-019	83-001
Mean	447	484	621	536	569	1929	668	796
Maximum	550	600	1080	770	930	6300	1280	2840
Minimum	53	320	265	265	190	290	345	300
Std. Deviation	89	59	140	104	163	1427	168	456
N	31	26	28	27	28	29	65	68

Note: * = mean shown with standard error

FIGURE 18. Conductivity (umhos/cm^2) in the Humber River, 1978-80.



STATION NUMBER	85-004	85-002	85-005	85-003	85-014	85-013	85-001
Mean	888	985	1190	879	1120	1005	1208
Maximum	1950	2550	2050	1600	3350	3450	5500
Minimum	250	465	375	285	305	330	375
Std. Deviation	331	537	374	259	487	634	849
N	38	28	29	29	61	48	52

Note: * = mean shown with standard error

FIGURE 19. Conductivity (umhos/cm^2) in the Don River, 1978-80.